The Cotton Gin and Oil Mill

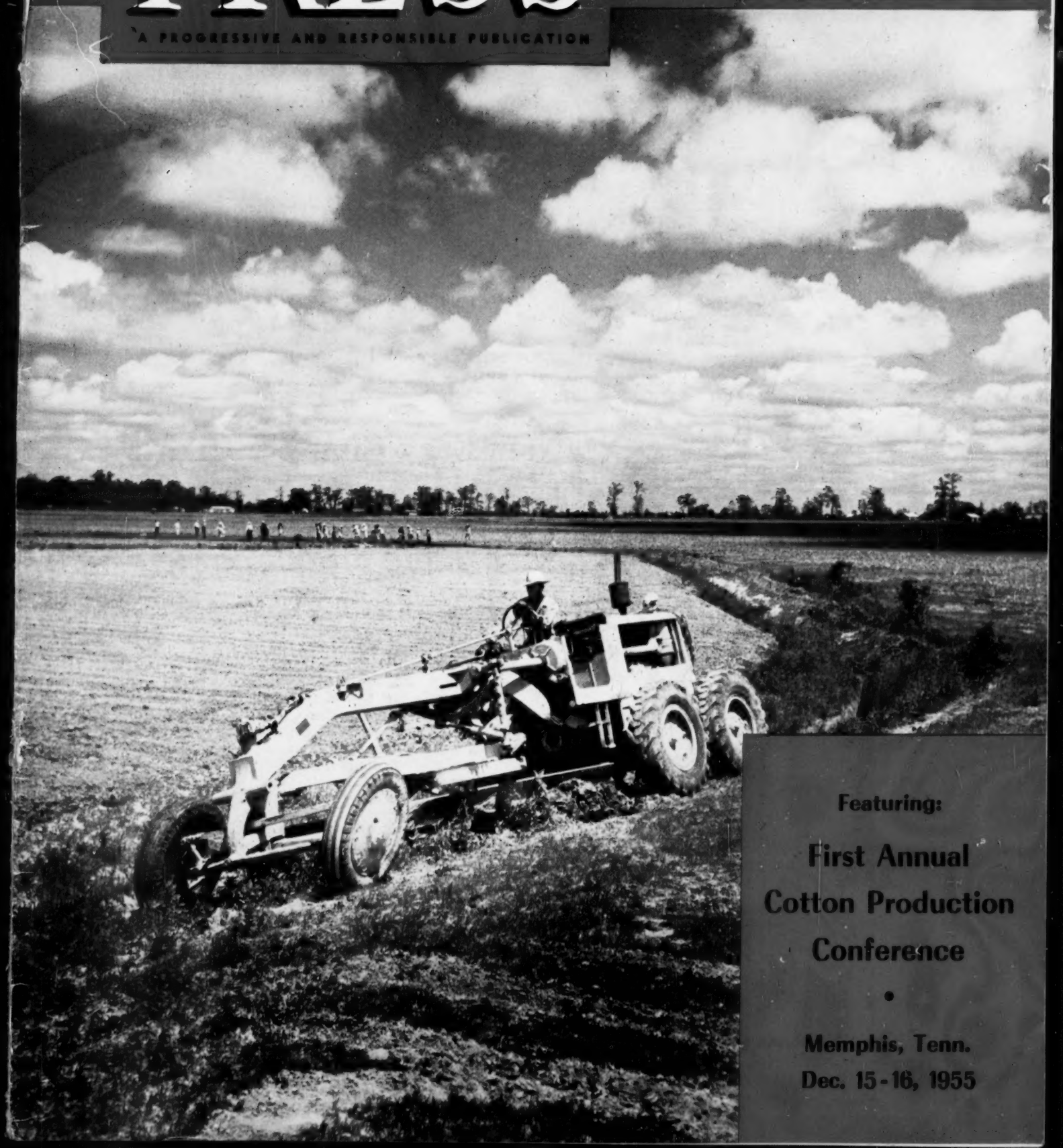
PRESS

DECEMBER 31, 1955

56th year

THE MAGAZINE OF THE COTTON GINNING AND OILSEED PROCESSING INDUSTRIES

A PROGRESSIVE AND RESPONSIBLE PUBLICATION



Featuring:

First Annual Cotton Production Conference

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Memphis, Tenn.
Dec. 15-16, 1955

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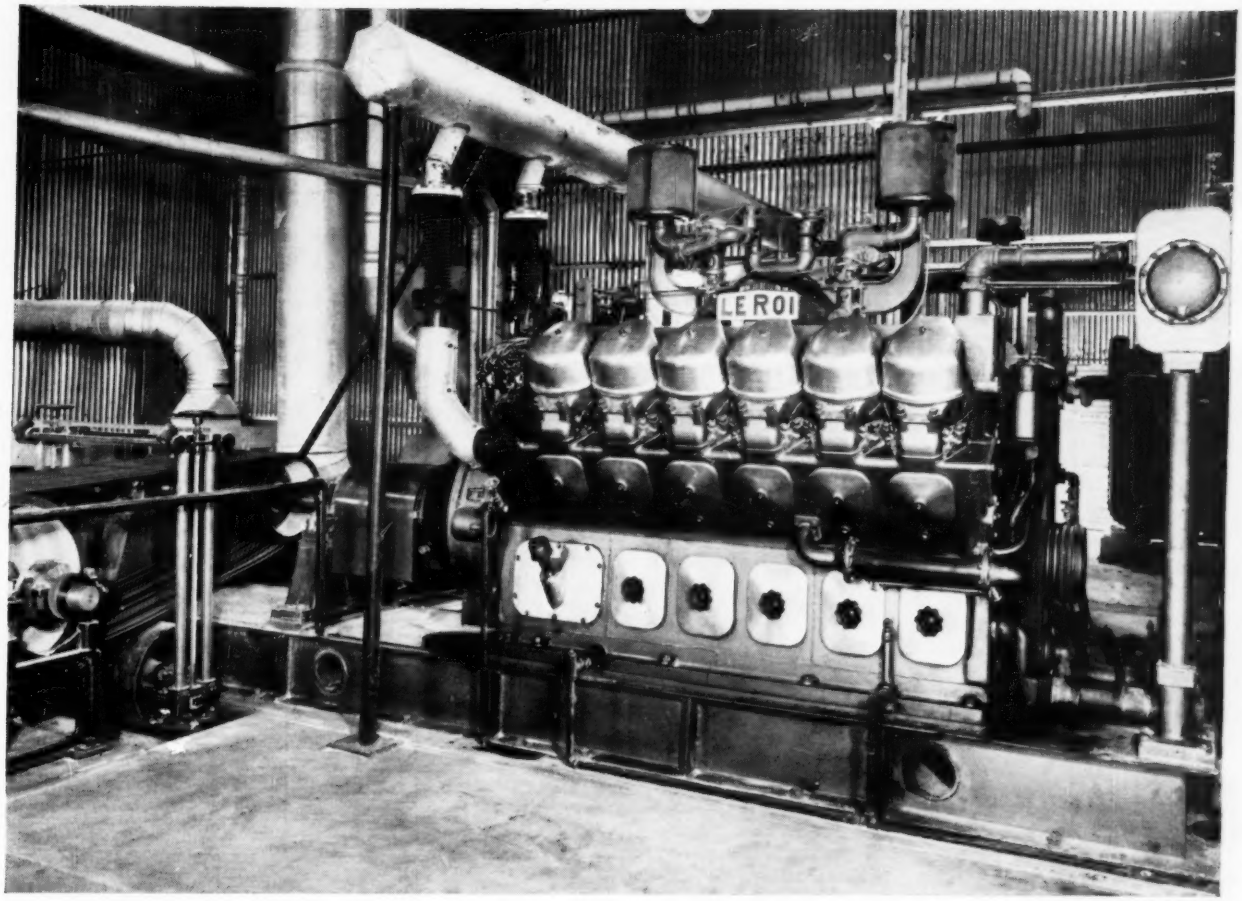

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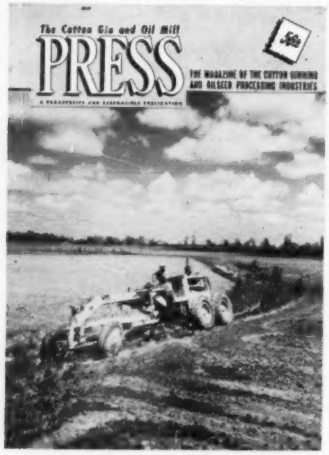

★ ON OUR COVER:

The use of modern, efficient equipment (such as that shown in our cover scene) is one of the ways in which farmers are working to increase production efficiency and lower costs. Such production problems as this are discussed throughout this issue, which reports the addresses and panel discussions at the recent Beltwide Cotton Production Conference held in Memphis.

Photograph by Caterpillar Tractor Co.

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The Cotton Gin and Oil Mill PRESS...

READ BY COTTON GINNERS, COTTONSEED CRUSHERS AND OTHER OILSEED PROCESSORS FROM CALIFORNIA TO THE CAROLINAS

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OFFICIAL MAGAZINE OF:

National Cottonseed Products Association

National Cotton Ginners' Association

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California Cotton Ginners' Association

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THE COTTON GIN AND OIL MILL PRESS

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EXECUTIVE AND EDITORIAL OFFICES:

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A PROGRESSIVE AND RESPONSIBLE PUBLICATION

SHOWN is a portion of the crowd of more than 800 at the first annual Beltwide Cotton Production Conference.

First Annual Cotton Production Conference Held in Memphis

Leaders from industry, research and educational organizations review progress of defoliation and control of insects, diseases and weeds at Beltwide meeting, Dec. 15-16, sponsored by National National Cotton Council, USDA, land grant colleges, and others.

PRODUCTION PRACTICES which must be used effectively, all together, to build a strong base for cotton in its fight with competitors were stressed at the first annual Beltwide Cotton Production Conference, Dec. 15-16, at the Peabody Hotel in Memphis.

Sponsors of the meeting included the National Cotton Council, USDA, land grant colleges of the Cotton Belt, the agricultural chemicals industry, farm organizations and other groups. They were well pleased with the attendance of more than 800 persons from throughout the U.S. and several foreign countries, and by reports of progress in solving production problems made by authorities on the program. The Conference replaced separate meetings on insect control, weed control and defoliation that have been held in the past, and included other subjects.

Addresses and panel discussions which were presented at this meeting follow:

Welcome and Purpose Of Conference

CLAUDE L. WELCH, Director, Division of Production and Marketing, National Cotton Council, Memphis.

WHY HAVE WE come together for this meeting? What do we expect to accomplish?

Broadly speaking, the purpose of this conference is to strengthen the production base of our cotton industry by pointing up the need and opportunities for, and by directing our actions toward, faster scientific and technological progress to reduce costs and improve quality, thereby increasing incomes and strengthening cotton's competitive position.

In one way or another, all of us here today are directly concerned with, and can make a major contribution to, this matter of building a stronger production base for the cotton industry.

Those of you who are with public farm research and educational agencies have a very large share of responsibility for servicing the scientific and technological needs of agriculture. Cotton, as the largest agricultural crop in the area and one of the largest in the nation, has benefited greatly from your work in the past, and certainly looks to you for a vital part of the job of building a better future for cotton.

Those of you who represent commercial concerns have a real opportunity to provide increasing quantities and qualities of materials and services for our industry. Cotton provides one of your biggest farm markets, and if cotton should be supplanted by synthetic fibers which aren't farm-produced, this market would simply disappear, without compensating market expansion in some other part of agriculture.

Of course those of us who are actually a part of the cotton industry are keenly aware that our rate of progress in improving production efficiency will, in a large way, determine the future prosperity of the people who derive their livelihood from cotton.

So all of us here at this meeting have a keen and mutual interest in speeding up the rate of progress in cotton production. The idea in having this meeting is that we can move ahead faster if we move ahead together.

The grave problems that American cotton faces today emphasize the need for moving ahead faster. In the market place, our competitors have established for us a virtual ceiling on the relative price at which cotton can continue to move into consumption. And, on the "underside," or cost of production side, we see the price of various items that growers must buy continue to inch up and up.

Since we can't do much about getting higher prices for cotton—in fact, we may have to take less in order to hold our markets in the years ahead—we are left with cost reduction and market expansion as about the only ways for farmers to maintain or improve their income.

But, there's also another important aspect to this conference—that of improving cotton's quality and then preserving that quality all along the line from the field to the mill door. More and more "push" is being put on quality all the time because it is so important in holding our old fiber markets and in helping us to compete for new ones.

• **Quality Influence** — In studying this quality matter, we have found that quality not only affects cotton's use value

but also has a powerful affect on price because it influences processing costs.

So, when we fail to produce desirable qualities, or when we allow cotton to lose part of its quality, we carry a heavy and unnecessary handicap in the race for markets. Sometimes it seems that some of the technological progress being accomplished may tend to actually be working at cross-purposes with cotton quality improvement and preservation. That need not be so; it should not be so. There is an abundance of evidence to show the compatibility of technological progress and the production of good quality cotton, as well as quality preservation.

Many of cotton's problems in production should come into sharp perspective during this conference. Our opportunities for doing something about these problems, individually and through group action, should be equally well defined.

If this conference can accomplish these things I believe it will make a significant contribution toward guiding our individual and group efforts so that their combined effect will be faster progress in cost reduction and quality improvement which are key factors that go a long way in determining consumption, markets and incomes.

As this conference program unfolds, I think that each of us will gain a much better appreciation of, the necessity for a research, education, and service approach that recognizes the fundamental importance of applying the appropriate "bundle" of good production practices to each farm rather than the piecemeal application of single practices without regard to their inter-relationships or combined effects. This is the basic thought that guided your program committee in its planning for this conference.

Cotton's Problems and Opportunities

DR. M. K. HORNE, JR., chief Economist, National Cotton Council, Memphis.

CURRENT ESTIMATES put the carry-over next August at something like 14 million bales—the highest ever. For next season we face the third straight year of cumulative cut-backs, but even so, we shall still see the surplus continue to go up unless there is a sharp decline in yields, or a sharp increase in demand, or a very substantial amount of both combined.

The task of thinking clearly about cotton's trouble has been greatly complicated by an explosion which has swept across the southern states this season—the explosion in yields per acre. After soaring to all-time highs in 1953 and again in 1954, the Beltwide yield has exploded upward in 1955 by 75 additional pounds to 416 pounds per acre; seven-eighths of a bale per acre.

What does it mean? As of now I can only suggest that a full appraisal would make up quite a research report and that it would include a number of different sections or chapters.

One chapter would seek to answer the question: What is the trend in yields per acre? Obviously many factors are involved in this year's big yields, but apparently one of those factors (an important one) has been the spread of improved scientific methods to a much wider fraction of all the acres planted to cotton. Insofar as this is the explanation, it means a real acceleration in the upward trend of yields per acre.

Another chapter would be on the subject of the surplus. We have to cope with this paradox: Increasing yields, with all the relief and hope they are bringing us, have also been bringing a lot of our large cotton supply.

Another chapter would have to do with the incomes of cotton farmers. The average farmer has had a poor income situation relieved very substantially this season by his increase in yields. But he still has a serious income problem, even though he has grown nearly 50 percent more cotton than his allotment was calculated to produce, and even though some 20 percent, more or less, of his production is moving into the surplus.

Another chapter would deal with our capacity for growing cotton. It would ask: Where now are the Malthusian prophets who were predicting that in a few years the nation's farm land would be inadequate to produce the raw materials to feed and clothe it? Where now are the synthetic fiber speech-makers who joined in the refrain and made headlines by saying that they would save this nation from a fiber deficit in the years ahead by building new plants to take up where the productive capacity of our land left off?

Then there would have to be a chapter dealing with new problems of production control. The increasing tempo of yield improvements does indeed make it harder to envision how production can be kept in line with demand. Now, even more than in the past, the farmer will have a normal tendency to produce more

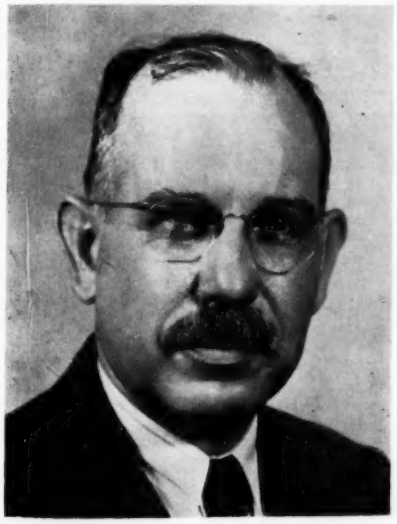
cotton than the market can readily absorb.

A related chapter would consider the predicament of the individual farmer, who is seeing his capacity to produce go up while his permission to produce goes down. Increasing yields in the absence of expanding markets point logically to just this predicament. Because he has unused or half-used productive resources, he sees his unit costs increased by it. He sees his leverage for adopting new methods and for pushing on at a faster rate of progress reduced by it.

And then the final chapter would face up sharply to the question: After all, is all this technological progress good or bad for the cotton farmer in view of the way it increases production, complicates his operations, and obscures his chance to get some particular price in the years ahead?

If we lived in a dream world—where the cotton farmer had no competition for his markets, and where he had no competition for labor and other resources of production, and where he had no real concern for improving his economic status, but only for maintaining the status quo—we could say that this was a very good question. But we are actually living and struggling to find our feet in an intensely competitive world, a world in which the ability of cotton to survive at all as a useful source of income to American farmers depends on its ability to make technological progress.

The increase in yields gives a great new urgency to the importance of expanding our market, but it implies to us that if we can have a market that is reasonably large and if we can keep it expanding gradually through the years we can also hope that the farmer's costs will decline and his net income will trend upward through the years. This is the only way to see a sensible future for American cotton. Technology is at the heart of it. Our increasing efficiency, in proving that research can do wonders for us, proves that we must move with all haste to get a great deal more of it. It proves that our hard-pressed cotton economy, struggling as it is to find the means to survive and prosper, may find a great deal of its answer in increased research.



Heads Program Committee

DR. J. D. LINDSAY, Texas A. & M. College, will be chairman of the technical program committee for the spring meeting of American Oil Chemists' Society, April 23-25 at the Shamrock Hotel in Houston. Assisting Doctor Lindsay will be the following: Dr. C. M. Lyman, department of biochemistry and nutrition, Texas A. & M.; H. D. Fincher, process engineer for Anderson, Clayton & Co., Houston; W. D. Harris, chemical engineering department, Texas A. & M.; A. C. Wamble, Cottonseed Products Research Laboratory, Texas A. & M.; and F. G. Packard, refineries, Anderson, Clayton & Co.

• **Market Expansion** — I said we must have an expanding market, but the experience of recent years has brought us a contracting market. The total off-take of American cotton has declined, not because of our net performance on the domestic market, but because of a worsening situation in exports. During the three crop years from August 1949 to August 1952, our exports averaged more than five million bales a year. This year the Department of Agriculture says the total might be 2.7 million bales, or 2.5 million, or less. More and more we are having it pointed out that if present trends continue this country will be out of the export market in two or three more years.

The foreign world generally has reached the highest level of income that it ever knew and is consuming more fiber than ever before. Why then are our cotton exports declining?

First, there is the general bearishness in foreign countries about the price of American cotton. As long as people think that the price of anything is going to be lower, they are reluctant to hold inventories of it. In addition, we have been seeing what amounts to a fire sale by foreign cotton producing countries, struggling desperately to unload their stocks of raw cotton. Foreign prices have generally dropped six or eight cents a pound (some more and some less) in recent months. This is the reason why U.S. exports have come almost to a halt.

However, there are two other reasons, of a much more fundamental nature, for our loss in exports. One is foreign cotton production. Last season we were hit by a sharp revival of foreign expansion in the very year when our own acreage was painfully reduced. The whole foreign world increased its production by a net of almost two million bales. We faced the agonizing fact that the deterioration of our exports was no longer a superficial matter of inventories but had become a fundamental matter of competitive production.

This season foreign production is estimated to be up again, though less sharply than last season.

• **Rayon Expansion** — But there is still another reason of great importance for the decline in our exports. This is the new tempo of foreign rayon expansion. In the foreign world as a whole, cotton production has doubled since the end of World War II, but rayon production has quadrupled.

Foreign rayon expansion hurts us just about as much as foreign cotton expansion. It is these two things together that have hurt the fundamental trend of our exports and have raised a very genuine question as to whether our cotton is going to have an export market in future years.

From our standpoint there is only one possible answer. Our whole production system is bursting with evidence that it could not adjust to a nine million bale domestic market. That would cut the heart out of our technological progress and would destroy our long-range ability to compete even for the domestic market—for any market. And our production system is also bursting with evidence that we cannot adjust satisfactorily to a nine million bale domestic market plus two or three million bales of exports. If our cotton industry is to have any future at all, we have got to find a formula that will get us up to a bigger market at home and abroad—up to 14,15, 16, 17 million bales—a dynamic market that has no ultimate ceiling—a market to match the dynamics of cotton production.

There is such a formula.

It is a formula having three components: price, research, and promotion. I hope it is clear that we mean research in a broad and not a narrow sense. Technology might hit the correct meaning more precisely. Of course we mean to include more than just finding new scientific methods; we mean finding them and carrying them into successful use by means of education, capital, and management.

It is a sure-fire formula, and it would save the American cotton industry; but there are two or three things that have to be understood about how to make the formula work.

The first thing is that the formula does include price and research and promotion—not one of them alone, or two of them, but all three of them together. We have to be in dead earnest about all three of them. Price alone will never save us. Research and promotion alone will never save us. The three things are all bound up together as they make their impact upon our market, upon our farmers, upon our whole industry.

Again and again, in practical situations where we are fighting for markets, it is impossible to distinguish between the separate effects of the three basic elements of competition.

Improved technical service to the mills consuming cotton, is that quality or promotion? You can well argue that it is either or both, but you can also point out that the result amounts to the same thing as a lower price.

If we turn out stronger, cleaner, better cotton, we say, of course, that this is a matter of better quality.

In recent years there has been a wonderful new emphasis upon design and fashion in the field of women's cotton apparel. What is this—quality or promotion? Obviously it's both and there's no way to separate the two.

• **Inseparable Formula** — If we are going to apply the formula that will really save us—price, research, and promotion—we have to accept the fact that all three of them are really and truly important and inseparable. We can't get far if we dedicate our minds to one of them and pay lip service to the others.

You may know that the Cotton Council has recently published a research report, prepared by several economists on its staff, which deals especially with price and which points out evidence that we need to improve our competitive position in price, research, and promotion all combined.

I will repeat just two figures from that report, dealing with research, which relate especially to the work of this conference. The synthetic fiber industry of this country is spending at least 60 million dollars a year on research devoted

to fibers. Cotton is a much bigger industry, but the entire research expenditure devoted to cotton by all public and private agencies combined is probably about 14 million a year, less than a fourth as much.

Now cotton's research problem is neither smaller nor simpler than that of the synthetic fibers. It is bigger and more complex. We have to take this seriously. If we haven't the vision to see its meaning, we haven't the vision to survive as an industry.

• **Timing Important** — And there is still another thing that has to be understood about this formula that could save our industry. This the matter of timing. Price, research and promotion can build up the consumption of American cotton by millions and millions of bales—but they can't do it overnight. They will never do it until we get a program based on the realization that our position today in competition for fiber consumption is the result of what we did or failed to do three years, five years, ten years ago; and that our position three or five or ten years from now will depend upon what we are doing today.

I think the greatest danger to the future of cotton is the fact that this fundamental truth is often obscured, so that people see it only dimly, if at all. It is obscured by the very special influence of inventories upon the markets for cotton. We are greatly impressed with an 11 or 14 million bale carry-over of raw cotton in this country. Perhaps we also know that there is a 10½ million bale carry-over (a very low stock) of raw cotton in all foreign countries combined. But this is just the beginning of the inventory picture. Inventories also have to be held by spinners, weavers, knitters, converters, garment makers, the other industrial fabricators, wholesalers, retailers—all over the world. Finally, the ultimate consumer is perhaps the biggest inventory holder of all. If we had the whole picture, we probably would see that the real inventory of cotton at every stage in this country and throughout the world is not 11 million or 20 million bales, but that it is now and tends always to be somewhere between 75 to 100 million bales as a prefectly normal thing.

The use-up of our cotton by the final consumers all over the world probably goes right along at a steady pace, trending either up or down but not changing abruptly from year to year. But the offtake as we usually see it consists of two things: the exports of raw cotton across our national boundaries and the spinning up of raw cotton in our domestic mills. These two measures of our market (especially the export part) are jolted up or down time and again, not by any shift in the final use-up of cotton but by shifts in the mood of people as to how much inventory they should hold. The most volatile part of the whole inventory picture, by far, is the part which we look upon as the inventory; namely the raw stocks in this country. Those stocks, which are intrenched in our minds and also in our legislation as the inventory or carry-over of cotton, and which have so much to do with the amount of cotton the farmers may grow from year to year, serve actually as the shock-absorber for changes in market sentiment all over the world.

We need very much to make a clear distinction between two different concepts of selling cotton. One is to increase the final use-up of cotton products by the ultimate consumers: a long-range concept. The other is to move cotton out of your own inventory into somebody else's inventory: a short-range concept.

For obvious reasons, for which no one is to blame, a great part of our industry's thought and effort is pre-occupied with the short-term problem of moving cotton from inventory to inventory. This, of course, is important; but my point is that it obscures the nature of our ultimate problem and makes it hard for us to get price, research, and promotion into their right perspective.

In my humble view it seems that in order to understand the present deep trouble of American cotton, we have to begin by recognizing that our problem is in two parts, and that each part has to be diagnosed separately. There is the short-term part and the long-term part. In the short-term, there has to be a way for our farmers and our whole industry to go on operating on some reasonable basis. In this the inventory situation is surely involved. But we also want to have a future, and our future depends on whether we can make the final use-up of cotton trend upward, and the key to that is price, research and promotion all combined. A short-term solution will not solve the long-term problem, and a long-term solution will not solve the short-term problem; but it's hard to see much sense in solving

Conference Quote:

"If cotton farmers and tractor drivers had college degrees on today's modern farms, where cotton production has become an exact science, the world would be a better place to live in."— HARRIS H. BARNES, JR., farm operator, Sherard, Miss.

either problem unless we solve both problems.

If we get a realistic program of price, research and promotion—and if we look out across a period of years for the results—we can have the greatest kind of confidence in the future of American cotton. The evidence is all around us.

After all, the foreign consumption of fibers is expanding very rapidly, when you think of cotton and rayon together. For a good many years, the annual rate of increase in the combined consumption of cotton and rayon abroad has averaged about two million cotton bale equivalents per year. If we get into a position to win for ourselves even a modest fraction of the future increase in the foreign market, then in time we can build up our annual exports by millions of bales. This would be a very modest goal indeed. It would not involve forcing back competitive production or even halting its expansion, but merely sharing in the market which will open up for future expansion.

On the home market we have had some competitive losses, but our net competitive showing has been incomparably better here than abroad. The worst competitive threat which we face at this time is a sort of left-handed compliment to cotton. Rayon, having lost ground in open competition with cotton for a great many uses, has recently been slipping back into some of those uses in the form of blends with cotton.

Actually our total domestic market has shown no downward trend at all. Our trouble is that we cannot be satisfied merely with a market which doesn't decline. We have to have an expanding market. The main reason it hasn't expanded is that the total market for all fibers, including the synthetics, has failed to expand in recent years. Fibers as a whole are taking a smaller share of the consumer dollar. With a very inadequate program, cotton has demonstrated a lot of competitive strength. With an adequate program, it could push its way not only to a larger share of the fiber market but also to a larger share of the whole consumer dollar.

Finally the technological revolution in cotton production should give us a basis for a certain restrained kind of confidence that we can meet our competition both for markets and for the resources of production. The explosive yield picture is now the most dramatic evidence of it. American industry as a whole increases its productivity per man-hour by some three percent per year. The American cotton farmer, who was so long renowned for his lack of progress, is now running way ahead of industry. He has increased his productivity per man-hour by an average of six or seven percent annually the past eight or nine years. There is no telling how much he increased it in 1955. This by itself doesn't prove that we are strengthening our competitive position. Foreign cotton producers can make progress, too. In future years we may have to run like the devil to keep our lead over them. And the great technical progress of the synthetic fibers means that from now on we are in a field of competition where a man has to run fast even to stand still.

Price, research, and promotion — all three together in an adequate program —a program dedicated now to the proposition that we must have a great and prosperous cotton industry three years, five years, ten years from now. Unless we get such a program there is no way out of our problems. If we get it, there is no end to our opportunities.

Increasing Efficiency By Integrating Practices

DR. WILLIAM L. GILES, Superintendent, Delta Branch Experiment Station, Stoneville, Miss.

ON MOST FARMS, any study of a single farm enterprise is only a segment of the entire production picture, and farm-management specialists have long recognized the need for fitting the pieces together. We need to keep in mind that the present discussion of integrating cotton production practices deals with only one piece of the entire picture of production on most farms.

Like a play in the theater, cotton production involves a scene, which is the land, and action that amounts to the application of practices. The scene and the action influence each other.

Until quite recently, our treatment of land as a factor in cotton production has been generalized to a surprising degree. Fundamentally, each field or cut is a distinct production unit. Just as machines in a factory vary in characteristics and capacity, so pieces of land vary in characteristics and capacity.

Experience has taught most farmers a great deal about the individual fields which comprise their farms. A storehouse of information is available to supplement experience. However, the observations and sources of additional information are frequently forgotten after the last boll is picked. Detailed soils and topographic maps are available from the Soil Conservation Service, county soil surveys, and private soil-consulting services. Most states offer free soil tests which serve as guides to fertilizer needs. Extension workers and others offer assistance in planning field layout for row arrangement, drainage, and irrigation. As simple an instrument as the spade or soil tube will reveal the location of hardpan if one exists.

Aside from the characteristics of the soil, the location of the field in relation to other fields, woods, and streams has a bearing on production practices. Early weevil "hot spots" are points to be watched from the very beginning of the season. Corn may serve as a trap crop for bollworms early in the season and a center of infestation later.

• **Mechanized Practices** — Turning to the application of practices, we are immediately aware of the stellar role of the tractor driver. We need to remind ourselves that mechanization of cotton production is not just mules on wheels. Old Joe may have been the best mule handler on the place, but it does not necessarily follow that he will ever be a competent machine operator. Next to the manager, the machine operator is the most important person in the cotton-production picture. It is the responsibility of management to select and train machine operators. Training programs for machine operators are as essential to tractor farming as advances in machine efficiency. Too frequently, unskilled operators are made totally responsible for handling and servicing machines costing more than $10,000.

Machine performance cannot be expected to surpass the skill with which the machine is handled, nor can a production practice be expected to yield results beyond the exactness with which it is applied. The care with which things are done is paramount when considering the tractor driver and his importance in the process of integrating practices for greater efficiency.

Preparations for next year's cotton crop are under way now, and the manager needs to decide, while still taking this year's crop to the gin, whether or not fields or parts of fields to be planted next season require deep tillage or land leveling and whether or not he intends to irrigate.

On a soil where a hardpan exists, experiments at the Delta Branch Experiment Station have shown yield increases in excess of 1,600 pounds of seed cotton per acre attributable to deep tillage. Striking as this yield increase is, other benefits resulting from the practice were observed which on a field scale might have a profound influence on timing other practices and total efficiency. After rains, surface soil on untreated plots remained wet until excess moisture evaporated. In contrast, rainwater infiltrated the treated plots rapidly, leaving the surface workable several days before the untreated plots could be crossed with equipment.

• **Land Leveling**—Consideration of land leveling should not be limited to fields to be irrigated. Land leveling forms a surface for mechanization. Low places delay land preparation, delay planting, increase weed problems, and keep mechanical harvesters idle when they should be running full force. Land leveling may influence the timing and excellence of each practice from seedbed preparation through harvest.

And what about the growing trend toward supplemental irrigation? Experiments show that other cultural practices must be maintained at a high level if irrigation is to be profitable.

In one series of tests, non-irrigated cotton yielded more than irrigated cotton where no insect control was used. Insects preferred the irrigated cotton because it furnished more squares. Where insects were controlled, irrigation was unprofitable where water was applied after the crop was badly wilted or where water penetration was limited by a hardpan. The axiom is: "Don't irrigate unless you integrate."

Long before the first planter squeaks next spring, land will have been bedded in anticipation of planting. The uniformity of beds in regard to height, shape, and row spacing will influence weed control and mechanical picker efficiency.

Four-row cultivators or oil applicators cannot perform effectively on non-uniform rows. The picking unit of the mechanical picker is gauged by the large tractor wheels; therefore, alternately high and low middles influence the position of the unit.

Mechanical production involves the use of multiple-row equipment. So it is essential that busters, planters, and cultivators be set so they will follow each other in the field like precision tools.

Weed control is the least integrated practice in cotton production. Weeds are like sin. Both are universally recognized as evil, both are eternally with us, and man has never made a very determined effort to eradicate either.

The influence of one season's weed seed crop on the weed problem in subsequent years is apparent when one considers that a healthy pigweed plant will produce several hundred thousand to more than a million seed. These seed can be expected to remain viable in the soil for 4 to 20 years. Control of weeds throughout the season is necessary to reduce seed carryover. Effective weed control is impossible unless the problem is viewed in its entirety and consideration given to all practices which influence the growth, propagation, and destruction of these pests. Land leveling, bed uniformity, placement of fertilizer, and plant population have a bearing on weed control. Actually, seed treatment and planting dates might logically be listed as weed-control practices, since shade from uniform stands is one of the most effective means of suppressing weeds.

I could continue for a very long time in describing additional relationships between one practice and another..

The important thing we should remember is to give continual thought to ways new practices can be integrated and what influence they may have on production efficiency. In planning experiments, we can consult and cooperate with specialists in other fields. In presenting results to Extension workers and others, we can point out the influence of one practice on another. We can become intimately acquainted with individual practices and study their interrelationships.

Our aim should become a One-Point Program—EFFICIENT PRODUCTION.

Fertilization's Role In Efficiency

DR. RUSSELL COLEMAN, Executive Vice-President, National Plant Food Institute, Washington.

AVERAGE COTTON YIELDS increased from 145 pounds of lint per acre in 1927 to 265 pounds of lint in 1950. During this period fertilizer consumption went up almost in direct proportion to the increase in yields. In 1927 an average of only 95 pounds of fertilizer per acre was used whereas by 1950 the use of fertilizer had more than doubled to 203 pounds per acre. The above facts show definitely that progress has been made toward more efficient cotton production, and that a major contributing factor has been the increased per acre use of fertilizer.

Recently a number of studies have been made by agricultural experiment stations in cotton producing states to determine the potential cotton yields if proven research techniques were adopted on each farm. In Georgia, where an average of 242 pounds of lint was produced during the 1949-1950 period, the experiment station estimates that an average of 500 pounds of lint could be obtained if 700 pounds of fertilizer per acre were used instead of 325 pounds, along with other good management practices. In Louisiana where 404 pounds of cotton were produced (1951-53 average), the experiment station estimates that 600 pounds of lint could be produced if the proper fertilization were used. The results in South Carolina show in effect the same response pattern, indicating that the 275 pound lint average in the 1949-1951 period could have been increased to 500 pounds if 800 instead of 550 pounds of fertilizer had been used, along with other recommended practices. Results are available in a number of other states to show that there is yet a great opportunity for increasing cotton yields by the proper use of fertilizer.

• **Lower Production Costs** — The most significant factor about the opportunity for increasing per acre yields, however, is not that America's farmers can produce more cotton but rather that with increased per acre yields come lower production costs. A recent study at Clemson, S.C., shows that an average farmer in that state has $45 fixed costs per acre regardless of what yield he produces, These data show that by making a small additional investment in plant food he can actually cut his cost per pound from 28 cents with a low rate of fertilizer to 22 cents where adequate fertilizer is used. On a profit per acre basis, his net income could be increased from $15.51 per acre to $56.94 by using the proper kinds and amounts of fertilizers.

Somewhat similar calculations have also been made by the University of California for irrigated cotton. In that state the fixed costs were $96 per acre. The actual profit per acre was increased from $132.68 to $183.78 by using fertilizer. The production cost per pound was lowered from 15.6 cents, where no fertilization was used, to 14.6 cents where the crop was properly fertilized. A Tennessee study shows that a 47 percent increase in production, brought about by doubling fertilizer use and following other good practices, would net a 260 percent increase in profit per acre. Again this is only possible because of the lower cost of producing a bale of cotton at the higher yields.

This raises a rather significant question: Could America's farmers produce fewer total bales on fewer acres and yet realize as much profit from cotton?

There are those today who claim that the best solution to our surplus problem is to move back to the type of production which we had in 1927. There are others who feel that the surplus problem can best be solved in other ways; who insist that because agriculture has produced more than an abundance it should be punished by being deprived of adequate research and educational funds. I, for one, am convinced that agricultural research must move rapidly ahead if our present, as well as our future farm problems, are to be solved. I believe we can produce more efficiently without adding to our surplus problems.

• **Less Acreage** — In South Carolina, Clemson College has estimated that farmers could realize more net profit from 400,000 bales of cotton produced on 400,000 acres in an efficient manner than they currently realize from 695,000 bales produced on 1,175,000 acres. In Arkansas it has been estimated that farmers could produce equally as much profit from one-half the total number of bales as from that which they currently produce. This could be done on less than one-half the acres if adequate fertilization along with other good practices were applied to Arkansas farms. Therefore, it appears from this information that farmers have an opportunity to increase their

Dairy Team Wins Crushers' Award

WINNERS of the award offered by Mississippi Cottonseed Crushers' Association and the Mississippi State Dairy Judging Contest are the boys shown here, members of the Bolivar County team. Left to right, front row, are Milton Thornton and Richard Cowan; and back row, Bern Prewitt, Sheldon Fletcher, Jr., and Leon Williams, assistant county agent and team coach. The team will compete in the National Dairy Judging Contest.

profits materially by lowering production cost, regardless of whether they increase total production.

Let's ask ourselves what could be done if agricultural research were fully applied so that each bale would be produced in the most efficient manner—and that we would produce no more bales than would go into consumption. It is estimated that by applying technical knowledge, the average acre yield could be increased from 339 to 520 pounds per acre. If this could be done, our cotton needs could be produced on one-third to one-half fewer acres than are now devoted to this crop. It is estimated the cost of producing cotton could be cut by six cents per pound. It would seem, therefore, that America's cotton farmers could realize more total net profit from the same or fewer total bales on less acreage. In moving toward the efficiency outlined above, increased fertilizer use is essential for it would be necessary to more than double the plant food used on each acre of cotton.

To me it is self-evident that with lower unit costs of production, farmers can maintain or even increase their current income levels while actually reducing the total number of units produced to meet our surplus problem.

If our research and educational forces can move faster toward finding ways and means of reducing unit production costs, and convincing the farmer that he should move his production program faster in this direction, this should contribute toward solving our present and future agricultural problems.

Planting and Spacing For Efficiency

REX F. COLWICK, Coordinator, Regional Cotton Mechanization Project, USDA, State College, Miss.

LOW-BED or flat planting is desirable for all phases of mechanized production in the humid areas. This requires well-drained fields that do not pond over the seed; but that is a requirement of any successful mechanized operation, so it cannot be said that it is an unreasonable or even unusual one. Good germination and stands are assured by raking the bed down to firm moist soil, and at the same time, raking the sprouted weed seed aside to the middles. This can be done with a planter equipped with runner-type openers and wings. If the planter is rear mounted, a cultivator on the front of the tractor helps kill the weeds and loosens the top layer of the bed which is to be shoved aside by the runner wings.

Subsequent weed control with sweeps can be done more effectively on a flat seedbed at high speeds. Where chemicals are used for weed control, a slightly elevated seedbed is usually preferred over a completely flat seedbed because it permits easier cultivation of the middles without throwing dirt on the treated band. In the irrigated areas of the Far West where furrow irrigation is used, it is necessary to form a water furrow between the rows early in the season, so an elevated seedbed is usually preferred to a completely flat one except where heavy early dirting is desired for weed control. Likewise, furrow irrigation on the contour in any area would require a slightly elevated seedbed to facilitate the forming of a water furrow in the middle during the first two or three cultivations. Late cultivations of low or flat rows will usually leave the rows slightly higher than the middle, but not peaked, at harvest time. This leaves a smooth operating surface for the mechanical picker and encourages defoliated leaves to collect in the middles instead of at the base of the plants.

In the sub-humid areas of the Southwest, the practice of planting the seed in a deep lister furrow has been popular for many years. Its purpose was to reach moisture and provide a defilade for protection of the young seedlings against blowing sand. In tests for the past seven years in West Texas, however, this deep furrow planting has not proved necessary. Planting in wide, shallow-to-almost-flat furrows has given better stands due to less soil crusting, has made early cultivation easier, and has produced a higher-fruiting plant for easier stripping. The shallow furrow also wastes less moisture during the planting operation than the deep furrow.

Under similar conditions in Oklahoma, a marked improvement over the deep furrow is a modified furrow with a cross-section similar to a "W". This is essentially a miniature bed in the bottom of a lister furrow. A certain amount of depression is maintained for wind protection, but the primary advantage is the slight elevation of the seed cap above the bottom of the furrow. This concentrates the heavy crusting to each side of the seed furrow instead of directly over it. In two years' tests, this modified seedbed has given better stands than other types of seedbeds. Weed con-

trol by sweep cultivation was not affected by this modification of the lister furrow, and it shows promise of being adaptable to pre-emergence weed control if the apex of the seed cap can be flattened.

• **Equipment** — Planting equipment has shown considerable improvement in the past several years, but more research is still needed on seed furrow openers, pressing devices, and metering devices.

In general, the seed furrow opener that places the seed in intimate contact with the moist, undisturbed soil at the bottom of the furrow has been most satisfactory. In the humid areas, the commonly-used runner-type opener has been improved in tests by adding a boat-shaped wedge at the bottom and rear of the blade to give a firming action to the bottom of the seed furrow. In the sub-humid Southwest, the chisel-type opener has been improved by shield extensions which keep loose dirt out of the bottom of the furrow until the seed has fallen. The contact of the seed with the firm soil has been further improved in that area and in the Far West by the addition of a narrow, soft-rubber seed press wheel which operates ahead of the covering device. This prevents drying of the soil below the seed level. As a result, seed can be planted one to two inches shallower than was formerly possible. This speeds emergence and gives the seedling a much better chance to break through a crust.

Research with disk openers in the heavy clay "Buckshot" soils of the Mississippi Delta and in trashy land in the Southeast has given promising results. The desirable feature of the disk opener is the clean, positive-type furrow it opens under adverse conditions.

Hill-dropping devices have been improved in the past several years and there are now several on the market that drop seed in a rather compact hill at high planting speeds.

Metering devices for drilling the seed uniformly are in need of improvement. It is *not* imperative that each individual seed be placed uniformly within a fraction of an inch with respect to the next, but it is important not to bunch the seed or to have skips in the row.

• **Types of Spacing**—Both hill-dropping and drilling have their place, depending upon the ensuing production practices. Hill-dropping is preferred by chemical weed control investigators. Tests have shown that it is compatible with all phases of mechanization, including harvesting with a spindle picker, if the spacing of hills is kept in a range of 8-20 inches. If hills are too far apart, there is a tendency for mechanical picker efficiency to drop off due to the slugging action created by the intermittent passing of heavy and light loads through the machine.

Drilling is essential to efficient stripper harvesting. The plants should not only be uniformly spaced, but they should be in as straight a line as possible since they have to pass through a space of about three-fourths inch in the bar and roller type machines. If the plants are too far out of line, bark will be stripped and mixed with the cotton.

• **Plant Stands** — Now for the perennial question, "What is a stand of cotton?" Fortunately, for purposes of this discussion, the areas in which similar populations are optimum can be divided according to method of machine harvesting; i.e. spindle picker areas and stripper areas. The spindle picker area includes roughly all of the Belt except the central and western halves of Texas and Oklahoma, which comprise the stripper area.

In the picker area, the range in which the yield has not usually varied significantly due to population is from 20,000 to 60,000 plants per acre. The best picker efficiencies have usually been in the upper half of this range, so it would seem logical that the 40,000 to 60,000 range would be best. However, the yield in dry years occasionally shows a decreasing trend at the upper limits of this range. In very wet years, the cotton in this upper limit may become rank and spindly and create a lodging problem. This often delays maturity and makes defoliation coverage more difficult, thereby increasing leaf trash in the sample. For these reasons, it has been deemed advisable, in trying to arrive at a very general recommendation, to lower this upper limit of 60,000 to 50,000; realizing, of course, that unusual circumstances can cause exceptions to this rule, and reserving the possibility that more replications of unusual growing seasons in the future might further reduce this to 40,000 plants per acre.

The lower end of the range might also be adjusted upward to bring it nearer the optimum in picker efficiency without decreasing yield. The desirable characteristics associated with the heavier populations, such as fewer vegetative branches, higher first fruiting branch, shorter stalks and limbs, and more shading effect on weeds, will not normally be as pronounced at the low limit of 20,000 plants per acre as in higher populations.

Factors governing optimum stands in the stripper area are closely parallel to those in the other areas, but the population range is higher. With a short, dry growing season the plants do not grow large and lodging never becomes a problem. Here the range for yield is about 20,000 to 80,000 plants per acre, but here again the range is narrowed for safety to 40,000 and 60,000, and a medium population of 50,000 is a good one to seek. Extreme populations of 80,000 and above should be avoided as they do not improve the stripping efficiency significantly and tend to reduce yield.

The most significant facts to emerge from these studies of plant population as related to mechanization are that plant characteristics can be tailored to some extent to fit mechanized practices by increasing the population; that these unusually high populations, within certain limits, do not reduce the yield or quality; and that chopping to a stand is unnecessary except under unusual conditions.

■ DR. MARLOW D. THORNE is the new head of the agronomy department and DR. JOHN WYATT WEST the new head of the poultry department at Oklahoma A. & M. College.

Conference Quote:

"We must think of cotton production in its entirety. We must become intimately acquainted with individual practices and study their interrelationships. Our aim should become a one-point program—efficient production." — W. L. GILES, Delta Experiment Station, Stoneville, Miss.

Soil-Water-Plant Relationship

DR. MORRIS E. BLOODWORTH, Associate Soil Physicist, Texas Experiment Substation, Weslaco.

THE COTTON GROWER works with a three-phase physical system composed of solids (soil particles), liquids (water and soil solution), and gases (oxygen, carbon dioxide, nitrogen, etc.). To get the maximum yield and return from his investment, the grower is required to maintain the proper balance between these phases so that the plant will have the best possible environment in which to grow.

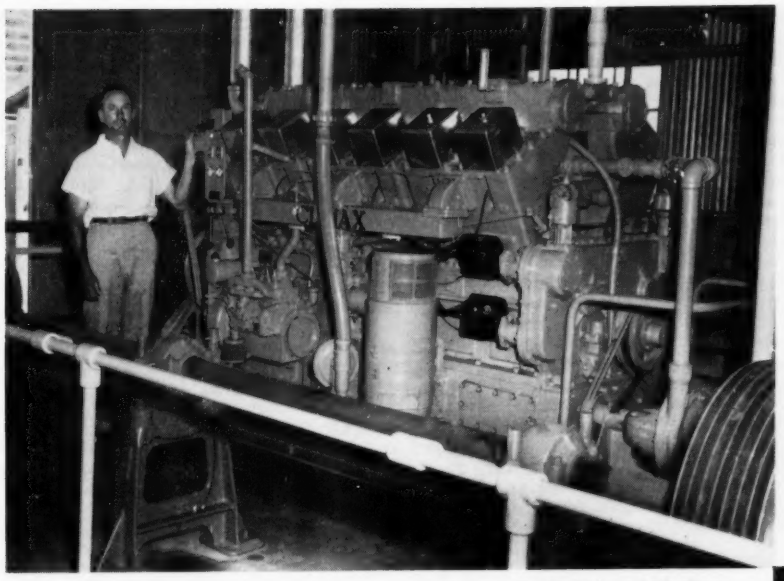
The movement and retention of the liquid and gas phases in the soil mass are very important factors relating to plant growth. The rate of movement and availability of these soil components for plant use depend greatly upon the physical and chemical characteristics of the soil.

• **Soil Characteristics** — The most basic and important soil physical problem which confronts cotton growers at present is poor soil structure. This particular problem has a wider coverage in all of the cotton growing regions than any other physical factor.

Soil structure is dynamic and can change as a result of time and management practices (or both) and has a tremendous effect upon plant growth and root environment. Clay plays a most important role in structure and is often the controlling factor. Some other factors which may influence the formation or deterioration of soil structure are tillage methods and equipment, growing plants (nature and distribution of the root system), biological activity, organic matter, various organic and inorganic compounds, climate, wetting — drying, and freezing—thawing.

Water may cause the breakdown of soil aggregates through swelling or by falling water drops. Both cause a dispersing action which results in particles or colloidal material being carried into the soil pores and eventually filling them with solid material. Since this action usually occurs after each irrigation or rain of moderate to high intensity, aggregates in the surface layer eventually become so broken down and puddled that a heavy crust forms at the surface and restricts the infiltration of water and diffusion of oxygen into the root zone. Such a physical condition produces unfavorable water and air relationships.

Another important physical problem which adversely affects cotton production is the presence of "hardpans" or "impervious zones." These zones are usually confined to the top foot of cultivated soils and vary in thickness from about four to nine inches. A soil condition of this kind greatly retards the percolation of water, restricts the plant's



Mr. Smajstrla and his Climax V-125.

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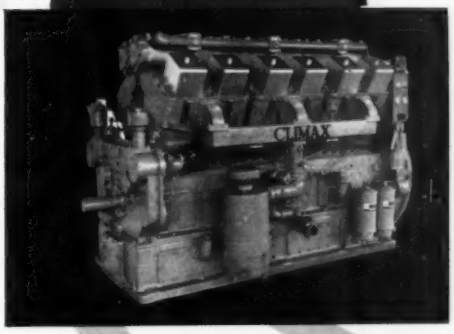

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root zone to a shallow depth, reduces available water storage capacity, lowers the oxygen diffusion rate to depths below the impervious zone and affects fertilizer placement and utilization by plants.

If high-intensity rainfall occurs or if irrigation water is applied at a faster rate than will percolate through the compacted zone, water will accumulate above the zone and cause a saturated condition. The large amount of soil reservoir below the compacted zone will not receive sufficient moisture unless water is applied to the surface for long periods of time. Excessive amounts of irrigation water near the surface for prolonged periods may also result in the accumulation of salt and eventually a salinity problem.

Compacted zones frequently force practically all of the roots to grow in a lateral direction because of the difficulty in penetrating the hard layer. A soil condition of this kind is not conducive to good plant growth and high cotton yields because the soil reservoir is not efficiently utilized from the standpoint of moisture and nutrient supply.

There are two approaches to alleviating the detrimental effects of compacted zones—agronomic and deep tillage (subsoiling). The agronomic program consists of following good crop rotations, in which are included grasses and deep-rooted legumes, and a well planned soil and water management program.

Chiseling or sub-soiling has been used in many cases as a remedial measure but has been considered as a temporary relief practice. This treatment cannot be recommended in every case because of the heavy equipment required and the expense of maintaining such an operation. By combining the two programs it appears that a more feasible method of preventing the formation of compacted zones will be brought into use within the next several years.

• **Water Management** — The significant factor in soil moisture availability to plants is that plants should be able to withdraw water from the soil rapidly enough to offset losses by transpiration. The exact criterion of adequate moisture depends greatly upon the depth and extent of root development (stage of plant growth), the water storage properties of the soil, rate at which the soil will release water to roots at given tensions, transpiration characteristics of individual crops, and weather factors which influence evapo-transpiration.

• **Field Capacity,** often referred to as "water holding capacity," is usually defined as the quantity of water retained in the soil after gravitational water has drained away following an irrigation or rain (one to three days later).

The **permanent wilting percentage** is the quantity of water remaining in the soil after plants have withdrawn all they can and wilt permanently. Permanent wilting simply indicates that the soil moisture content available for plant use is so low that absorption becomes too slow to replace water lost by transpiration; consequently, plant cells lose turgor, the plant wilts and eventually dies. The quantity of water retained in the soil between these limits is termed "available water" for plant use. However, in cases where salinity is a problem, the effect of soluble salts in the soil becomes an important factor in water availability and must be taken into consideration.

Recent studies have definitely shown that soil moisture is not equally available between field capacity and the permanent wilting percentage. The ability of the cotton plant to absorb water decreases as the soil moisture stress increases. Although cotton plants can withdraw water from the soil down to, and sometimes below, the presumed permanent wilting percentage, the variations in moisture transfer in heterogeneous agricultural soils make it almost impossible to determine the exact point at which cotton starts to become adversely affected by soil moisture stress.

Cotton irrigation research at the Lower Rio Grande Valley Experiment Station has generally indicated that the available soil moisture level should be maintained between 35 percent to 50 percent of total available moisture (average moisture content of top two feet of soil) in order to keep the plants growing and fruiting properly. Allowing high moisture stress conditions during fruiting and maturity stages usually causes a reduction in cotton yields.

• **Preparing Land for Irrigation** — Irrigation is essentially a method of providing water for plant utilization when rainfall is inadequate. Its purpose is to distribute water uniformly over the field so that the soil storage reservoir can be filled with a minimum of losses from evaporation, surface run-off, and deep percolation. Poorly planned and inefficient irrigation systems waste water, increase labor costs, create salinity problems, and cause erosion hazards by uncontrolled irrigation water. Plants growing on the slopes receive insufficient water, and those growing on the ends receive too much.

Although the initial cost of installing a well-planned and properly-designed irrigation system often seems expensive, the increase in yield and quality of crops, saving in labor, and conservation of water almost always repay the initial outlay in a short time.

• **Irrigation Factors** — The fact that cotton will grow and yield under prolonged hot, dry weather conditions with small quantities of water, if provided at the correct stages of growth, cannot be questioned. However, research has shown in recent years that cotton plants are very sensitive to changes in soil moisture and environment, and response to such changes is reflected in growth, yield, fiber characteristics, and possibly oil content of the seed.

Present research indicates that the timing of irrigation water applications to coincide with critical stages of plant growth demand is of much greater importance than the over-all water use or crop requirement. It is certainly obvious, too, that water is not the only important contributing factor in producing high yields. Other factors, such as fertility, tillage, insect control, etc., also figure prominently in the picture. Thus, in developing more concentrated research on the basic interactions of soil, water, and plants, we also need to consider the effects of all other factors of production.

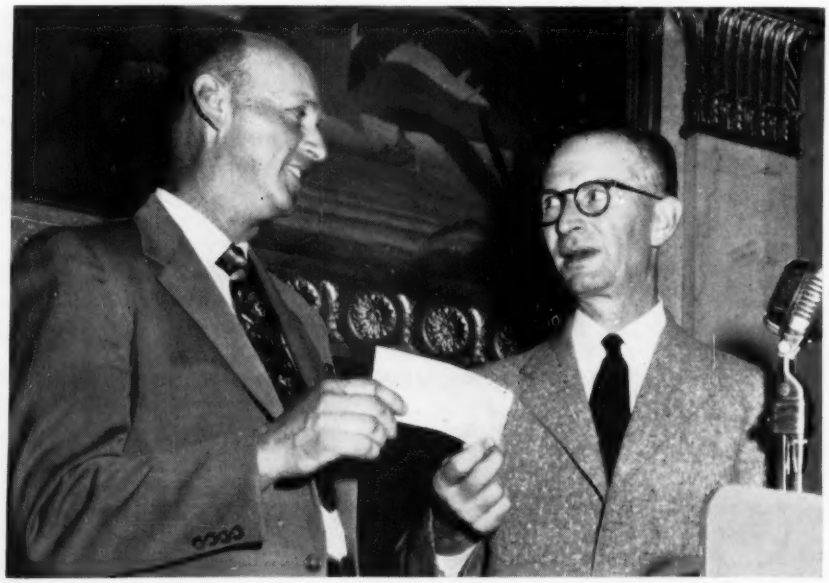
It has been shown rather convincingly that water use rates by cotton plants are largely dependent upon the stage of growth and availability of soil water. Water use by cotton varies over a wide range throughout the season. Experience has shown that cotton plants are often over-irrigated while young, and stressed during periods of high moisture demand.

The age-old problems of "when" to irrigate cotton and "how much" water to apply are still confronting research workers in all irrigated areas. There are no simple "rules of thumb" for handling them. The following is a generalized guide which must be adapted for each individual case:

1. The soil reservoir (0-5 feet) should contain an ample supply of water before cotton is planted (pre-irrigation unless rainfall is sufficient).

2. Young cotton does not use much water. Until plants are of sufficient size to afford partial shade for the soil,

(Continued on Page 18)



Receives Georgia Contest Check

NEAL DABBS, left, is shown receiving his first prize check in the Georgia 5-Acre Cotton Contest at the recent awards luncheon in Atlanta. J. P. George, Macon, president of the Georgia Cottonseed Crushers' Association, made the presentation. Details of the program and contest were published in previous issues of The Press.

Valuable As Soil Builders

Cotton Burs Scarce at Aiken Because of Use by Farmers

■ STUDIES by Paymaster Farms of value of spreading waste product on land show hikes in cotton and sorghum yields.

COTTON BURS are scarce at Aiken, Texas, instead of presenting a disposal problem as they do at so many gins. The reason for the scarcity is the extent to which farmers around Aiken are using the burs as soil builders on their fields.

ACCO Press reports that Anderson, Clayton & Co. Paymaster Farm conducted some tests on bur spreading. These tests, in brief, showed:

Five tons an acre and 10 tons an acre of composted burs were applied to different plots with no bacteria added. To adjoining plots five tons and 10 tons of barnyard manure were applied before preparing the land for the 1954 crop. (Field results were lost on the five-tons-an-acre application of barnyard manure.)

Pounds Snapped Cotton/Acre	Yield	Increase
Control plot	2570	*
5 tons composted burs	2830	260
10 tons composted burs	3672	1102
10 tons barnyard manure	3932	1362

Figuring the lint percentage of these increases at 25 percent (average lint percent for all cotton produced on the farm during 1954 was 26.6 percent) five tons of composted burs produced 65 pounds more lint. Ten tons of burs produced 275 pounds, and 10 tons of barnyard manure gave an increase of 340 pounds an acre.

Using an average price of 30 cents per pound for lint, it was estimated that five tons of composted burs gave a dollar return of $3.90 per ton, 10 tons of composted burs gave a return of $8.25 per ton and 10 tons of barnyard manure returned $10.20 per ton.

Thus it was determined that the percentage of dollar return is much greater from the higher rates of application than from the lower.

In another test in 1953, approximately 10 tons of dry burs an acre were applied in a field. These increased the yield 802 pounds of snapped cotton an acre. Actual yields were 2,796 pounds of snapped cotton an acre on plats getting no burs and 3,589 pounds an acre from the plat getting 10 tons of burs. This gave a net profit of $25 an acre. The same plat was planted to grain sorghums in 1954 and no additional burs were applied.

The same area was planted to grain sorghum in 1955 and throughout the growing season the location of the plat receiving the burs in 1953 was noticeable. The two plats yielded 5,314 pounds per acre and 3,482 pounds per acre respectively, with 1,834 pounds per acre increase, or 52.4 percent due to burs. The cash value of the grain at 1.59 per hundred pound weight is $29.16 per acre increase.

Treatment for both plats during 1954 was the same. Paymaster Farm was unable to determine the actual combined weights from the two different plats. But a conservative estimate of yield increase from the residual effect was 500-700 pounds of grain an acre, an income increase of $10-$15 an acre.

Sound Practices Increase Cotton Yield 65 Percent for Farmer

Complete insect control and the application of recommended amounts of fertilizer are largely credited with raising the cotton yield 65 percent above 1954 on the V. P. Street farm in Tippah County, Miss.

In 1954, Street picked nine bales of cotton from seven and a half acres of bottom land. In 1955 from the same land, he made 14 bales.

He credits this increased yield to following the insect control recommendations of Associate County Agent C. B. Betterton, and to the use of the amounts and kinds of fertilizer which a soil analysis indicated was needed on the land. Street says that the soils test let him know what the land needed.

"In 1954 I used 500 pounds of 5-10-10 mixed fertilizer under the cotton and 100 pounds of ammonium nitrate as a side dressing. In 1955, after the soils test showed my soil needed additional potash, I used 200 pounds of potash, 500 pounds of 6-8-8 under the cotton and side dressed with 200 pounds of ammonium nitrate," he said.

as viewed from The "PRESS" Box

• Trash Aids Citrus Growth

COTTON GIN TRASH is proving excellent cover material for young citrus trees in Arizona. At Yuma Experiment Station, citrus trees that received the gin trash grew almost twice as large in two years as those that did not. C. W. Van Horn, associate horticulturist, reports that the gin trash proved much better than a number of other materials tried.

• Linters Catalog

COTTON LINTERS catalog, dated Jan. 1, 1956, is available from F. P. Biggs, New Orleans Commodity Stabilization Service Office, Wirth Building, for $15 per copy per calendar year. The catalog is for use now, and covers cotton linters available for sale.

• Feed Sales Helped

TO HELP oil mills sell cottonseed feed products has always been a goal of the Educational Service of National Cottonseed Products Association, and is the objective of current advertising. Members of NCPA recently received a letter from A. L. Ward, Dallas, Educational Service director, calling attention to an advertisement that is reaching 1,637,716 potential customers through farm and livestock publications.

• Bargain Day Extra

HERE'S SOMETHING for nothing—at least almost nothing. The government is selling statistics for .0007 cents each in its big bargain of a data book, the Statistical Abstract of the United States. The only drawback is that the some half million facts in the 1955 edition, compiled by the Bureau of Census, are sold in block for $3.50, 25 cents cheaper than last year's book. The facts, ranging from abrasives to zinc, are arrayed in 1,064 pages and 1,166 tables, illustrated with 55 charts and neatly wrapped in cloth binding.

• Synthetics for Filters

SYNTHETIC FIBERS that go into high fashion garments also are being used extensively in filter bags for industrial plants, the DuPont Co. reports. Many new industrial applications of synthetic filter materials were exhibited by the firm at the recent Exposition of Chemical Industries in Philadelphia.

• Scorpions Profitable

SCORPIONS are more popular than ever—which really isn't saying too much. Ken Larman, attending Arizona State College, has caught 10,000 of the creatures. They are worth a nickel each to him alive. He sells them to the poison research laboratory at Arizona State where a serum is made to treat persons stung by scorpions. Larman finds his live specimens in old woodpiles, under tree bark, damp cellars and trash piles.

• Desalting Work Urged

TEN TIMES as much research as is now under way should be done to find a way to desalt sea water. This is the opinion of Senator Arthur Watkins of Utah, following a tri abroad. He believes that a practical, economical way of making salt water useful for irrigation and other purposes would help to prevent war in the Near East by making Egypt and other Arab countries more productive. Watkins said Congress had voted $14 million for use during the next 10 years in an effort to find an inexpensive method of desalting ocean water. "We should expand this program ten-fold," he commented.

• New Plastic Pipe

SOMETHING NEW in plastic irrigation pipe has caught New Mexico farmers' interest this season. This new plastic pipe had long life, flexibility, lightness as well as other advantages. A handy dandy repair kit comes with the pipe. The pipe is 12 inches in diameter, comes in 100-foot lengths and will carry 2,500 gallons a minute, says New Mexico Extension Service.

• May Aid Pest Control

MIGRATORY grasshoppers, the predominant destructive species of the West, prefer wild hedge mustard to alfalfa. This may be a clue to controlling the pest by controlling weeds in large alfalfa areas, USDA scienists say. Entomologists of USDA's Agricultural Research Service found in laboratory studies that the pest might not be able to maintain itself through many generations on alfalfa alone. Nymphs fed exclusively on alfalfa usually died before reaching adulthood. Adults were much smaller, laid fewer eggs and lived a shorter period of time.

Mills and Gins Aid Club In Honoring Farmers

Taylor Oil & Peanut Mills, Moultrie, Ga., and a number of gins of the area were among financial sponsors for the Bonus Farming Club sponsored by the Moultrie Kiwanis Club. Nineteen farmers who made outstanding yields of cotton, peanuts and tobacco were honored recently at a banquet.

In addition to the oil mill, the following gins were listed as financial sponsors: Jenkins Brothers Gin Co.; Berlin Gin Co.; and Norman Park Gin and Warehouse.

Four cotton growers qualified for the club by producing more than two bales per acre on five acres.

Estimated Reduction in Cotton Yield Caused by Diseases

Cotton diseases reduced the 1955 production of cotton by 1,796,334 bales, or 11.45 percent, according to an estimate made by the members of the Cotton Disease Council, with Philip J. Leyendecker of New Mexico State College as chairman and A. L. Smith, W. L. Cooper and Leonard Lett as members reporting subcommittee. The estimate was compiled, as in the three previous years, from 45 state estimates and is believed to be extremely accurate. The 1955 loss compared with a reduction of 14.55 percent and 2,301,182 bales fromdiseases in 1954. The following table gives details by diseases and states:

Diseases	Calif.	Ariz.	N. Mex.	Tex.	Okla.	Mo.	Ark.	La.	Miss.	Ala.	Ga.	S.C.	N.C.	Tenn.	Bales Lost	Percent Loss
Fusarium Wilt ... *F. vasinfectum*	0	0	0	.01	.1	2	2.4	3	2	.3	1.5	3.05	1.5	2.2	173,883	1.29
Verticillium Wilt ... *V. albo-atrum*	2.1	3.1	7.5	.6	.1	0	1.9	.1	1.75	†	0	0	.4	1.7	189,168	1.38
Bacterial Blight ... *X. malvacearum*	†	.41	.1	2.2	2	.5	1.25	.5	1.75	1.5	1.5	1.05	2	.2	222,611	1.08
Root Rot ... *P. omnivorum*	†	2.18	.1	3.3	.3	0	†	†	0	0	0	0	0	0	164,236	.42
Anthracnose Boll Rot ... *G. gossypii*	0	0	0	.9	†	.1	.1	.5	1	1	.5	.25	.5	.6	89,833	.4
Seedling Diseases ... *Rhizoctonia*, etc.	4	2.66	.95	2	3	10	2.5	3.5	.75	.2	3	1.25	3	.5	363,533	2.67
Ascochyta Blight ... *A. gossypii*	0	0	0	.06	0	.5	0	0	†	0	.5	.05	.1	.4	12,246	.11
Boll Rots ... *Rhizopus*, etc.	1.8	1.9	.05	.3	5	1	3.25	2	1.75	2	.75	7	10	1.6	322,082	2.75
Root Knot ... *Meloidogyne* sp.	2.1	2.02	.45	.01	.5	1	1.3	†	.5	2	1.75	3	3.5	.8	164,795	1.35
Others ...	* †	** .5	0	0	0	0	0	0	0	0	0	0	0	0	3,947	
Percent Loss ...	10	12.77	9.15	9.38	11.0	15.1	12.7	9.6	9.5	7	9.5	15.65	21	8		11.45
Bales Lost ...	137,500	100,805	26,466	412,838	54,890	70,389	236,163	61,551	208,050	78,270	73,338	103,165	90,205	52,704	1,796,334	
Yield Bales, 1955*** ...	1,250,000	700,000	265,000	4,025,000	450,000	405,000	1,650,000	585,000	2,000,000	1,045,000	705,000	570,000	355,000	610,000	14,663,000	

† Traces
* Crumple leaf virus
** Rust (Puccinia stakmanii Presley)
*** December 1, 1955, Estimate

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most of the soil moisture lost is through evaporation rather than transpiration. (Loss for this period varies from .05 to .13 inch daily.)

3. Without sufficient rainfall, the first irrigation is usually required just before or about the time blossoms appear. Soil moisture should not be permitted to go below 35 percent of available (average of moisture content contained in top two feet of soil) during the pre-bloom period.

4. From the blossom and heavy fruiting stage until approximately three-fourths of the bolls are firm and matured, cotton usually requires an irrigation frequency of 8 to 15 days. The peak demand for water occurs during the middle and latter stages of fruiting and boll maturity.

There are no exact methods for practical field determination of soil moisture. Several commercial soil moisture indicating devices are on the market today but none give a direct measure of available soil moisture. The old method of estimating soil moisture by the "feel" and "appearance" of the soil has probably been used more than any other. Such a method, even though it contains many fallacies, still has merit because of its simplicity and widespread application on many soils; however, its use requires experience and a knowledge of the soil on which observations are to be made.

Soil moisture observations by this method are made by digging in the cotton root zone (0-2 feet) with a sharpshooter shovel or soil auger. Several handfuls of soil are taken in each six-inch increment of depth and pressed firmly several times within the palm of the hand. Then the grower can get a good idea of available moisture by using the following guides:

Feel and Appearance of Soil	Moisture Content	Percent of Available Water
Dry, loose, and powdery	Dry	None
Crumbly, does not hold together	Low	Below 25%
Crumbly, holds together when pressed	Fair	25% to 50%
Can form ball and sticks slightly	Good	50% to 75%
Forms ball and is pliable (Can be ribboned between fingers; when squeezed, clear water sheen on surface of soil and hand).	Excellent	75% to Field Capacity
Free water runs out of soil sample	Too Wet	Above Field Capacity

In making such observations on fine textured soils one must consider that these soils can be ribboned some times and formed into a ball when pressed but still contain insufficient moisture for good plant growth.

Often the appearance and color of cotton plants are used as moisture indicators. These are not always reliable indicators because cotton plants have a natural tendency to "wilt" during the mid-day and afternoon hours if hot, dry weather prevails. Perhaps the best "wilt" symptoms of soil moisture deficit are when cotton plants show severe wilting during the earlier morning hours (8:30 to 10 a.m.). Wilting at this time of day indicates that irrigation water has been withheld too long and that the plants are in a highly stressed condition because of a lack of water.

■ Brief . . . and to the Point

EARL L. BUTZ, Assistant Secretary of Agriculture, said at the recent Plant to Prosper Rally in Memphis:

"Throughout the South there is a growing realization that we must be able to sell our cotton to people—not to government. Government itself consumes no cotton; it is people who do. People — not government — make up the lasting and permanently profitable market that our cotton so sorely needs at this time."

Panel Discussion:

New Developments in Disease Control

DR. JOHN T. PRESLEY, Plant Pathologist, USDA, Beltsville, Md., leader.

Seedling Diseases

DR. N. D. FULTON, Assistant Plant Pathologist, University of Arkansas, Fayetteville.

SEED TREATMENT materials may destroy or inhibit disease organisms on the surface of the seed (disinfestants), within the seed (disinfectants), or in the soil for a small area around the seed (protectants). The chemicals used for cottonseed treatment at present are quite effective as disinfestants, much less efficient as disinfectants and, in many instances, have little value as protectants. This is by no means an indictment against the materials presently in use, but rather is a reflection of the fact that cotton presents special problems in seedling disease control.

Cottonseed treatment is good insurance, but has decided limitations. Its principal value is from control of seedborne diseases. Present methods of application result in a relatively small area around the seed being permeated with chemical. Therefore, the cotton seedling is protected from soil-borne diseases only so long as it is within this zone or until rain, soil chemical action, or other factors neutralize the treatment material. Consequently, older seedlings may have long since passed through the fungicidal area created by the chemical. Once past this portection, cotton seedlings are completely at the mercy of their environment. Under warm, mellow soil conditions they appear able to resist almost any disease attack; under cold, wet conditions they lose completely their ability for resistance and succumb to any of a number of soil-borne disease agents.

In the last several years cotton seedling disease research has been intensified and several new methods of approach are being investigated. Included are trials for new seed-treating materials. In the past only two such chemicals, Ceresan and Dow 9B, have been recommended, but tests to date, although not covering the period of years felt to be adequate to give conclusive results, show that materials such as Captan, Agrox, Panogen, Spergon, Thiram and probably others may be as effective as those presently recommended, depending on whether reginned or acid delinted seed are used. However, evidence to date does not indicate that they are superior.

An approach that may have promise is that of applying a fungicide in an aqueous solution or as a dust to the soil around the seed as part of the planting operation. This is aimed at enlarging the protective zone around the young cotton plant. Tests with several such "in-the-furrow" fungicides have given rather erratic results. In some of the field trials reported, significant stand increases have resulted, whereas in others there have been no appreciable differences. PCNB, Captan, Zineb and Nabam have appeared in many of the tests although there undoubtedly are other promising materials. Work done in South Carolina by Arndt under controlled conditions shows that certain chemicals give a high degree of protection to cotton seedlings. At Arkansas experiments in controlled temperature tanks indicate Captan, PCNB, and rosin amine acetate will control seedling diseases of cotton in naturally infested soils if the chemical is properly distributed. These results would seem to point to a need of better methods of application in field trials.

• **Pelleting Seems Promising** — Some work has been done with "pelleting" or applying relatively large amounts of a fungicide to cottonseed with a binder to hold the material on the seed. Again this has as its purpose enlarging the zone of protection around the seed. The danger of injuring the seed with the increased concentration of chemical must be considered with this method, although its future prospects seem very promising.

Certain selected lines of cotton have been found to carry an inherent tolerance to cold temperatures. Experimentation is under way to discover the underlying physiologic processes which govern this cold tolerance as well as disease resistance and the vigor of the cotton seedling in general.

Research is also in progress with regard to the effect of nutrition on seedling disease reaction.

Although the disease-inciting ability of some of the seed- and soil-borne microorganisms associated with cotton seedling disorders is well known, the role of others is obscure. Studies are being made to learn more about the disease potential of this entire complex of micro-organisms. It seems probable that additional fungi as well as some of the eel-like animals known as nematodes will be found to attack cotton seedlings either singly or as members of a group of disease agents.

• **Distribution Important** — There is a definite necessity for continued research into the present methods of application of seed-treating materials. Any chemical seed treatment is dependent for its effectiveness on proper distribution on the seed. Improper distribution may result from operator negligence or, at least in some instances, from the design of the seed-treating machine. A continued effort to improve design in general and in particular toward foolproofing the equipment from the standpoint of the operator is indicated.

Research carried out on certain crops has shown that depth of planting as well as soil-moisture content greatly influences soil-borne disease. Another factor

in great need of further study is the influence of rotation crops, such as soybeans, on cotton seedling mortality.

An intriguing field of study to some plant pathologists is control of plant diseases by systemic fungicides. If the cotton farmer could plant seed covered with a chemical which would protect the seed and also be taken up into the seedling and thus render it resistant to attack by disease organisms, many of our problems would be solved. Work here and in England indicates that compounds with systemic fungicidal activity exist. Well-known antibiotics such as penicillin and streptomycin as well as several synthetic organic materials have been used. There is a great need for fundamental research on the behavior of these systemics both in the host plant and the disease organism. What is needed is a material relatively harmless to the plant, yet specific in its toxicity to the disease organism.

Fusarium Wilt and Nematodes

DR. A. L. SMITH, Pathologist, USDA, Alabama Experiment Station, Auburn.

THE FUSARIUM wilt nematode is really not as complex as previously thought.

Nematodes provide the openings through which the wilt organism enters the small cotton roots. Wherever wilt occurs, nematodes are present, and make the wilt worse by feeding on roots throughout the summer.

The most practical approach to this two-sided problem is the breeding of resistant varieties. The use of resistant varieties has greatly reduced wilt losses. The history of the development of resistant varieties goes back as far as 1895. From that time till 1941, a number of resistant varieties came into being, but none quite fulfilled all the requirements for wilt resistance, staple length, earliness, and other agronomic characters needed by growers.

• **Coker 100 Wilt** — In 1942 a new era was ushered in with the release of Coker 100 Wilt. This variety was the first to combine wilt resistance with earliness, high yield and other desirable agronomic characters. It proved to be equal or superior in yield to non-wilt-resistant varieties grown in the Southeastern States at that time.

The widespread use of resistant varieties has reduced wilt losses to an estimated 0.7 to 2.8 percent in North and South Carolina, Georgia, and Alabama, according to estimates for 1954.

While losses from wilt have been reduced to the vanishing point in some areas, the losses caused by nematodes are being recognized as a greater menace. This calls for more emphasis on the nematode problem.

Through a cooperative arrangement between the ARS, Cotton Section, and the Alabama Agricultural Experiment Station, a regional wilt-nematode screening program has been conducted for the past several years. Facilities of this program are available to all breeders. In this program, the breeding lines are brought together from across the Belt and tested under field conditions on a heavily infested soil at the Plant Breeding Unit at Tallassee, Ala. This test has proved valuable in determining not only which lines are most resistant of the commercial types but has uncovered new sources of root-knot-nematode resistance in the wild cottons. Some of the wild material has proven much more resistant than the commonly grown varieties. A new breeding program is underway to transfer higher nematode and wilt resistance to the commercial types.

From the control standpoint the soil fumigants have also proven effective. These materials control both wilt and nematodes and give remarkably increased yields where soils are heavily infested. Dowfume W85 at the two gallon rate and DD at the seven gallon rate per acre, row-application, have proven effective at the Plant Breeding Unit in Alabama and in other states. Because the cost of using these materials is $12 to $15 per acre, their use has not been widely adopted. A newer material, Nemagon, is being tested and promises to give results at much lower rates per acre. Preliminary studies in Alabama show good response at rates as low as one pint to two quarts per acre.

What can the cotton grower do to reduce losses from wilt and nematodes? There are four lines of action:

1. Plant a wilt-resistant variety on all soils known to be wilt infested. The following varieties are listed in about the descending order of their resistance: Auburn 56, Stonewilt, Coker 100 Wilt, Plains, Smith 78, Dixie King, All-in-one-Cross, and Empire. For soils very heavily infested, Auburn 56 is recommended. This variety has sufficient resistance to withstand the most severe wilt and nematode situations with minor exceptions and yields more than other commercial varieties on heavily infested soils.

2. Soil fumigants may be profitably

used to control wilt and nematodes on severaly infested soils.

3. Rotations with corn, sorghum, small grains, and many other crops are beneficial in reducing wilt losses.

4. Apply sufficient fertilizer to maintain maximum yields, with sufficient potash to prevent rust as recommended for the area.

Conference Quote:

"Defoliation for machine harvesting is a 'must' in much of Texas."—FRED C. ELLIOTT, Texas Extension Service, College Station.

Verticillium Wilt

DR. ALFRED B. WILES, Mississippi State College, USDA, State College.

VERTICILLIUM WILT of cotton is caused by a soil fungus which is present in many of our Cotton Belt soils. The fungus enters the plants through the roots and subsequently causes various degrees of stunting, foliar discoloration, leaf shedding, and darkening of the internal tissues. Under field conditions it is not always easy to distinguish Verticillium from Fusarium wilt; however, in the laboratory this is a relatively easy procedure.

Developing an adequate and practical control measure for this disease, as it occurs in this area, presents a challenge to both the pathologist and the breeder. Due to the nature of the disease and the crop, the use of resistance or tolerance offers about the only practical control measure that is available. On the other hand, the search for resistance to Verticillium in our upland cottons has been extensive but not entirely rewarding.

Severity of Verticillium wilt is closely associated with environmental factors, primarily temperature. There are many seasons in Mississippi when the disease is barely in evidence (1952, 1953, 1954); others in which there are mild outbreaks (1951); and still others when it occurs in rather destructive proportions (1950 and early season 1955). In the seasons where the disease is light, a variety such as Delta Pine 15, which is moderately tolerant to the disease, performs quite satisfactorily, but in years of severe disease none of our more common varieties have sufficient tolerance.

• **Gene Screening** — After extensive screening of various cottons both in the field and in the greenhouse, certain strains have been developed which are considerably more tolerant to Verticillium wilt than our commercial upland varieties. This material consists primarily of selections from Auburn 56, Alabama Hybrid 81-14, Empire, and Hartsville. While this material does not represent major gene resistance, as has been found in the case of resistance to Fusarium wilt, it does represent the highest level of Verticillium tolerance that we have found in upland cotton. Present indications are that increased tolerance must come from other species, such as the Sea Islands and the Pimas, and our greenhouse screening efforts at present are being directed toward this search for major gene resistance in other species.

By means of recurrent selection, it has been possible to raise, or at least standardize, the level of tolerance of the above lines, and if these strains were entirely satisfactory from all other standpoints, it would be easy to release a highly tolerant strain of Hartsville that would satisfy the need for a Verticillium-resistant cotton. But, when hybrids between tolerant strains and susceptible strains are made, the tolerance level must slowly be built up in succeeding generations. There is no doubt that this tolerance can be used, but it presents a more difficult approach than a major gene resistance would present.

There is another technique which attempts to build up or pyramid this tolerance by crossing two lines which each have a high tolerance to this disease. In this procedure it is the hope that the resulting hybrid will possess an even higher level of tolerance than either parent. This method has been tried in Mississippi, but the results obtained thus far have not been promising.

Another problem is that of properly subjecting the material to the disease. The material may be tested for its disease reaction either under artificial conditions such as in a greenhouse, or under field conditions where the disease naturally develops in severe proportions.

In Mississippi we have attempted to combine these two methods, but because of the usual lack of good field testing conditions we have had to rely rather extensively on the greenhouse. Representative material from our tests has been subsequently field tested in Mississippi as well as in Arkansas and New Mexico with encouraging results.

We have screened both in the greenhouse and in the field upland material from almost all available sources. From this material we have selected the most tolerant strains and have by selection stabilized this tolerance at a rather high level. Crosses have been made within these lines and with susceptible lines and selections are being evaluated for wilt-tolerance as well as for their agronomic desirability. The search for major gene resistance is being continued particularly among other species. The possibility of using irradiation as a means of developing a source of major resistance is being considered. It has given promising results in the case of another crop.

Bacterial Blight and Boll Rots

DR. JOHN T. PRESLEY, Plant Pathologist, USDA, Beltsville, Md.

THERE IS NOTHING NEW or mysterious about boll rots; they occur every year and every grower knows that a portion of the bolls he works so hard to produce will never be harvested for this reason. Many of the infected bolls are completely destroyed while others may produce stained, spotted, and immature, weak fiber which results in lower grades.

Cotton harvested from partially rotted bolls not only is lower in quality, but is more difficult to harvest. Seed quality is also lowered. Rots are more prevalent where cotton makes rank growth and where frequent rains occur. In certain localized areas of the Southeast it is not uncommon for 25-30 percent of the crop to be lost from boll rots. Serious damage may also occur in irrigated areas where excessive water is applied late in the season, particularly in rank cotton. In Alabama this past season actual counts of rotted bolls in an irrigated and non-irrigated portion of the same field showed exactly 100 percent increase in rotted bolls in the irrigated portion.

• **Attacking Boll Rot** — In attacking the problem of boll rots we must begin with the planting seed and follow through until the crop is harvested. Seed-borne organisms which cause blight and anthracnose infect the seedlings and later may attack the bolls, causing rots and stains. A thorough job of seed treatment will go a long way toward preventing this type of seedling infection.

In addition to seed treatment, a good program of crop residue destruction should be followed. Little is gained if treated seeds are planted in a field where diseased stalks and bolls are left on the surface. These should be turned under well in advance of planting to prevent spread of the disease to the new crop. There are also many other organisms, in addition to the two already mentioned, which are associated with boll rots. These organisms may enter the boll through insect punctures, through blight lesions or just the boll cracks in the opening process.

The important thing to remember is that the disease organisms are always in the fields just waiting for an opportunity to become active. Best control is through practices which reduce or prevent the occurrence of conditions favorable to them.

If entry is made at any time before the boll is fully open, some damage may result. The amount of damage usually depends upon the amount of moisture in the boll and also upon the amount of moisture in the air surrounding the boll. The longer the lint remains moist the greater the damage. None of the organisms can cause damage to lint in a normally opened fluffy boll of cotton as long as it remains dry. However, if the lint in a normally opened boll becomes wet from rain or irrigation water and remains wet for some time, molds may develop on the fiber. These molds cause deterioration, discoloration and often a high pH condition.

The time required for the damage to occur varies slightly with the particular organism present, but usually within 5 or 6 days considerable damage has been done which affects the dyeing and spinning quality of the lint. The important thing to bear in mind in connection with this latter type of damage is that the fiber must remain wet for the damage to occur.

• **Insect Control** — A good insect control program will reduce boll rots by reducing the avenues of entry, and will also prevent the leafy vegetative growth that often results from loss of bolls due to insect attack.

Over-irrigation and excess nitrogen will produce large leafy plants which prevent rapid drying of the soil surface, thus maintaining high humidity. Bolls, particularly on the lower portion of the plant, will fail to dry out and fluff under the conditions just mentioned and the boll rotting organisms will develop rapidly. In the Southwest skip row planting is reported to reduce boll rots appreciably.

If carefully controlled cultural prac-

(Continued on Page 35)

• Gin and Farms Use Two-Way Radios

TWO-WAY RADIOS are proving profitable for gins and large plantations in Arkansas, as they have done for business firms in many areas, according to South Mississippi County Agent D. V. Malcoh. Nine farms now are using the two-way radio facilities in the county.

J. E. Teaford, manager of Luxora Gin Co., installed his communication system as the result of an accident.

"It was a little over five years ago," Teaford says, "when a little girl was severely burned in a house fire on one of our island farms and it took several hours to get the information to headquarters and several more hours to get her to the doctor.

"After this, I vowed that it would never happen again if I could possibly help it and I installed the two-way radio system." Now Teaford testifies that he has direct communications with all the outlying districts of the farm.

"I would not operate the island land without the two-way radio communication system," Teaford told Malcoh.

Prisoners Present State With $1,500,000 Gift

Prisoners of the State Penitentiary at Parchman in the Mississippi Delta presented the state with a $1,500,000 present recently, according to Governor Hugh White.

This was the amount received for the sale of prison grown and harvested cotton on the 16,000 acre penal farm. It is $600,000 more than the legislature had appropriated for the institution's operation under Superintendent Marvin Wiggins. Wiggins said the cotton crop produced 7,400 bales, which in addition to other bumper crops made the institution almost self-sufficient for food during the last year.

Ed Hollowells Announce Arrival of Daughter

The Ed Hollowells of Atlanta are receiving congratulations on the arrival of a daughter, Katharine Nell Hollowell, on Dec. 28. The father is Southeastern field representative for the Educational Service of the National Cottonseed Products Association. Katharine Nell has a brother who will be one year old during January.

Calcot Names Directors

W. C. McFarlane of Clovis-Sanger Cooperative Gin and John Gilli of Kern Delta Cooperative Gin have been elected to the board of directors of California Cotton Cooperatives. Orval Knox of Chandler and Moulton Knappenberger of Phoenix have been named to represent Arizona grower members pending elections by growers.

Soybeans for Formosa

Mills in Formosa have received International Cooperation Administration purchase authorizations to buy about 28,500 metric tons of soybeans from sellers in the U.S. Deliveries are scheduled from Jan. 10 through April.

Honey Gratifies Texas Steers' Sweet Tooth

Steers like honey. Texas Experiment Station tests with honey that was not marketable for human consumption show that beef cattle like it and the honey has about the same feeding value as blackstrap molasses.

Station research workers used honey in the concentrate mixture at a level of 15 percent, but amounts up to 30 percent should prove satisfactory. The mixture containing honey produced about the same gain, carcass weight and carcass grade as that containing molasses. Efficiency of feed utilization also was about equal.

The extracted honey used was free from wax but contained considerable dark granular material. It was rather heavy in cool weather but when warmed, mixed readily with the other concentrates. The honey was provided by members of the Texas Beekeepers Association.

The research workers point out that at times considerable amounts of unmarketable honey are available, and as a possible new use the test feeding was done.

■ **J. P. CARMICHAEL has been named editor of the Agricultural Extension Service of the University of Georgia, College of Agriculture. He will be in charge of disseminating the college's press releases to all media and head public relations work.**

• Linters Can Expand Cushioning Sales

INCREASED bedding, furniture, and automobile production plus a definite price advantage offer cotton an excellent chance to maintain and expand its share of the cushioning market, according to a report by R. T. St. John, executive secretary of the National Cotton Batting Institute.

St. John, also manager of the industrial and cottonseed products campaigns for the National Cotton Council, spoke to 150 members of the NCBI at the group's second annual meeting at the Conrad Hilton Hotel in Chicago recently.

The 1955 officers of the NCBI will continue to serve during the coming year. They are: David E. Schimmel, president, Allen Industries, Rahway, N.J.; Henry Chanin, vice-president, Henry Chanin Corp., Atlanta; C. E. Theobald, Jr., vice-president C. E. Theobald & Son, Memphis; Ellis H. Warren, vice-president, Standard Cotton Products, Inc., Flint, Mich.; John J. Ryan III, treasurer, John J. Ryan & Sons, Greenville, S.C.; S. E. Brandwein, secretary, Brandwein-Mazur Co., Chicago; R. T. St. John, executive secretary; and Louis V. Rando, assistant treasurer, Memphis.

The first year of NCBI activities coincided with a peak year in the consumption of cotton linters, St. John pointed out. Linter consumption for each month of 1955 has been substantially larger than in 1954, and all previous records were broken last September when 147,000 bales of linters were consumed. The first two months of the new season beginning Aug. 1 showed a 37 percent increase over 1954.

St. John asserted that while the general expansion of economy and greater production of bedding, furniture, and automobiles were largely responsible for linter consumption increases, the favorable price situation had surely been a factor. He stated that linter prices had fallen steadily since 1953, leveling off in 1955, while the price of natural latex had more than doubled in the two-year period.

Outlining advertising plans for 1956, he said that aggressive sales activity at a time of favorable price conditions is particularly advantageous. Recent findings by the Council's market research department reveal that women make over 80 percent of furniture and mattress purchases. In recognition of this important factor, NCBI advertising is being shifted to two of the leading women's service magazines, Ladies Home Journal and McCall's, which have a combined circulation of over nine million. The Nov 15 issues of Bedding Merchandiser and Retailing Daily carried insertions announcing the 1956 consumer campaign in the Journal, McCall's, and House Beautiful.

A theme capitalizing on the current prestige of cotton in women's fashions was chosen. The Maid of Cotton project is considered to be the most outstanding promotion of cotton; and she will be shown in NCBI's first ad in 1956 as she learns from a salesman why cotton-cushioned furniture is the best buy. Other insertions in next year's campaign will carry out the fashion theme with headlines, "You dress cooler in cotton, and you sleep cooler on cotton cushioning" and "The smartest choice in fashion . . . the smartest choice in cushioning."

Consumer advertising will be merchandised through leading trade magazines. Plans call for the distribution of a folder encouraging tie-ins with NCBI advertising to manufacturers' advertising agencies, advertising managers of department stores, and leading furniture stores. Also in preparation is a retail plan book, containing floor and window display ideas, newspaper mat suggestions, and promotion ideas for selling cotton cushioning.

Guest-speaker Mary Davies Gillies, home furnishings editor of McCall's magazine, stressed the timeliness of acquainting women with the quality characteristics of cotton in all its forms and the possibilities for the bedding industry to capitalize on the importance of bed room comfort and decoration.

Murchison Will Retire, Succeeded by Brandis

Dr. Claudius T. Murchison, economic adviser to American Cotton Manufacturers' Institute, will retire from active service early in 1956, A. K. Winget, Albemarle, N.C., ACMI president, announced Dec. 28.

Doctor Murchison, who has completed two decades of executive and advisory duty for textile organizations, will remain with the Institute as a consultant. He intends to center effort on the writing of a book delineating the development and economic structure of the U.S. textile industry, and will transfer his work from the Washington office of ACMI to his residence in Wellfleet, Mass.

His successor will be Dr. R. Buford Brandis, who has been associate economist for ACMI since January, 1955. He holds a Ph. D. degree from Duke University and also has degrees from University of Richmond and Harvard University. Doctor Brandis for a number of years was on the faculty of Emory University, Atlanta, and also was on the staff of the U.S. Chamber of Commerce.

USDA Data Promising on Winterization Process

An acetone-hexane process for winterizing crude cottonseed oil which USDA scientists have studied for several years now is ready for pilot plant and commercial trials, the Department reports. It promises to eliminate some of the greatest difficulties in winterization of cottonseed and peanut oils.

Reprints of articles about various phases of the process and other information are available from Southern Regional Research Laboratory, 2100 Robert E. Lee Boulevard, New Orleans.

Crushers Continue Dairy Scholarship in 1956

North Carolina Cottonseed Crushers' Association is continuing the annual scholarship to the 4-H Club boy making the outstanding record in dairy work in 1956, Mrs. M. U. Hogue, Raleigh, secretary-treasurer, has announced.

That this longtime cooperation with 4-H activities is appreciated is indicated by a recent letter of appreciation received by Mrs. Hogue from L. R. Harrill, Extension 4-H leader, thanking the crushers' group for its continued interest in boys' dairy work.

Canterbury Elected Head Of Clearing Group

Lee Canterbury, resident manager of Cargill, Inc., grain firm, was elected president of the Memphis Board of Trade's Clearing Association Dec. 20.

The association operates the Board of Trade's futures markets for soybeans, soybean meal and cottonseed meal.

Canterbury succeeds Ed Jappe of Marianna Sales Co.

Others named to take office Jan. 1 for a year's term were W. E. Buxton of E. E. Buxton & Co., W. R. Copeland of W. E. Richmond & Co., John L. Hudgins of Merrill Lynch, Pierce, Fenner & Beane, and Ila Jehl of Marianna Sales Co., directors. Arthur A. Williams was elected executive vice-president and Mrs. Mary Joyce Angero was named treasurer.

Fred Lovitt of L. B. Lovitt & Co., will serve as vice-president of the association. He is the unopposed candidate for president of the Board of Trade and that officer automatically serves as vice-president of the association. He also will appoint a representative of the Board of Trade's directors to serve as a director of the association.

■ **BILL FOREMAN, National Cotton Council, Memphis, recently was elected president of the Midsouth Public Relations Society .**

Presenting

Fred L. Wilson

Ennis, Texas

FRED L. WILSON entered the industry in 1921 at Planters Cotton Oil Mill, Ennis, Texas, as weigher, and went with the Memphis Cotton Oil Co., Memphis, Texas, in 1925 as cashier. He went to the Planters Cotton Oil Co., Waxahachie, Texas, in 1927.

In 1932 the Waxahachie mill was closed and he was transferred to the Ennis mill in charge of the company's gin plants. In 1940 he became superintendent of the Ennis mill, which position he held until he recently became manager of the Ennis mill. He is a past president of the National Oil Mill Superintendents' Association.

You must keep ahead of cotton pests...

spray early and ALL SEASON for effective control

Tender young cotton makes a tasty meal for boll weevils and boll worms, flea hoppers, cut-worms and other pests. One heavy infestation at an early stage of the growing season can ruin a perfect stand of cotton. Inspect your crop often, and thoroughly. At the first sign of pests, spray or dust with the right Stauffer insecticide to give you an effective kill.

Fight the boll weevil . . .

Dust with Stauffer Insect Dust BHC-DDT-Sulfur 3-5-40. For heavy infestations use Stauffer Insect Dust BHC-DDT-Sulfur 5-5-40.

Fight the boll worm . . .

Dust with Stauffer Insect Dust BHC-DDT-Sulfur 3-10-40.

Consult your Stauffer distributor. He carries a complete line of ready-to-use finished insecticides, both sprays and dusts, specially formulated for the particular pests in your territory. These include high gamma BHC and DDT, Heptachlor, Paraflow 400, Captan, Malathion, Toxaphene, Aldrin, Systox, Lindane, Chlordane, Parathion, Dieldrin, Tepp, Aramite, Endrin, Sulfur. Also available in concentrated form for formulation locally.

The cost of Stauffer protection is low, compared to the profits you risk losing.

Stauffer CHEMICALS SINCE 1885

STAUFFER CHEMICAL COMPANY

380 Madison Avenue, New York 17, N. Y.
636 California Street, San Francisco, Calif.

Houston • Los Angeles • Omaha • Tampa • Harvey • Weslaco • No. Little Rock • No. Portland

SOUND IRRIGATION PRACTICES shown here are: Left, a technician of the Soil Conservation Service uses a probe to find out if moisture has penetrated to the root zone and whether additional water is needed. On the right, liquid fertilizer is being metered into irrigation water. This saves time and labor.

Oklahoma Cotton Irrigation Guides

Fastest growing industry in the state, with 4,000 percent increase in 15 years, now has available information to guide farmers in the use of sound irrigation practices that will maintain soil fertility.

By GRANT WOODWARD
Agricultural Engineer, SCS

IRRIGATION is probably Oklahoma's fastest growing industry. In 1940, less than 5,000 acres was irrigated in the entire state. By 1955, this acreage had increased to approximately 200,000 acres —an increase of some 4,000 percent in 15 years.

No business or industry can experience this rapid growth without encountering many problems and without the need of establishing clear-cut procedures for operation. As early as 1940, the Soil Conservation Service began a program of conservation irrigation — a program to conserve and use properly available water as well as controlling soil erosion and, at the same time, maintaining soil productivity. It has been the history of practically all irrigation projects that crop yields under irrigation start out fairly high and then decrease rather rapidly as soil productivity is lowered.

This happens because most irrigation farmers have been dryland farmers and are not acquainted with the needs and requirements of their soil when placed under irrigation practices.

This was experienced in the Altus irrigation project where irrigated cotton started out averaging slightly over one bale per acre, but in a period of five years gradually decreased to about two-thirds of a bale per acre. This decrease was caused by the soil productivity being lowered before farmers learned the need of proper cropping rotations, the use of fertilizers, and the proper time and amount of water to apply.

In contrast to the above general condition, a few farmers have been able to produce rather consistently two bales per acre of cotton in the Altus project. Farmers who observe their neighbors producing high yields naturally tend to copy their methods of operation. This is fine as long as their soil is the same as their neighbors. However, there are many different soils and they have varying capacities for root growth development, for storage of water, rate of intake, ability to give up water to the plants and fertility needs.

The Soil Conservation Service has studied these problems and attempted to accumulate and put into table form all the available research data as a guide for new irrigation development so that farmers may maintain maximum yields during the period that they are converting from dryland farming methods to the more intensive irrigation farming procedures.

• **Guide Described** — These tables are known as irrigation guides. Of course, the fact that only 5,000 acres were irrigated in Oklahoma in 1940 makes it apparent that little research information is available in Oklahoma. Most of the data had to be obtained from other areas and adapted as much as possible to Oklahoma conditions. A complete irrigation guide would be too bulky for this article, so the information for cotton has been taken from the irrigation guide to show the purpose of and use that can be made of irrigation guides.

It should be recognized that an irrigation guide must be based on the application of irrigation water to take care of plant moisture needs and that rainfall will alter the time and amounts of irrigation water to apply. The guides are based on the needs of crops on various soil types. For practical purposes, we divide these soil types into the six following groups:

1. Deep heavy clay soils.

This is the third article on state guides for cotton irrigation published in The Press; the article on Texas appeared last Nov. 5 and an article on Louisiana in the Dec. 3 issue. Similar articles for other cotton-growing states will appear in the future.

2. Deep, fine-textured soils.
3. Deep medium-textured soils.
4. Moderately coarse-textured soils.
5. Coarse-textured soils.
6. Shallow soils.

The general irrigation needs for cotton production on these soils are as follows:

• **Deep Heavy Clay Soils** — These soils are deep, fine-textured soils which take water very slowly. They will hold considerable moisture for crop use, usually about two inches per foot of depth. A mature cotton plant with proper root development should obtain moisture from about three and one-half feet of this soil. Therefore, this depth of soil would hold about 2 x 3.5 inches or 7 inches of water. If we are to keep the cotton plant in maximum production, we should plan to irrigate when one-half of this moisture is gone. We would, therefore, need to irrigate when the soil needed 3.5 inches of water to refill the root depth of the soil.

Mature cotton plants and evaporation during the hot summer months will remove about .23 inch of this moisture per day; therefore, the crop will require irrigation 3.5 inches divided by .23 inch or approximately every 15 days unless rainfall occurs within this period. A good irrigation system can utilize about 75 percent of the water delivered to the land, so to store the 3.5 inches in the proper soil root zone, we will need to apply 3.5 inches divided by .75 or 4.6 inches of water. These soils are very tight, and to be able properly to get water into the soil a grade of not more than two inches per 100 feet should be used in the rows. Row lengths can generally be up to one-quarter of a mile.

The rate at which water should be applied would be determined by the rate at which the soil absorbs the water. For good irrigation practice on these soils and also on the other soils described later, a stream sufficient to reach the far end in about one-fourth the time needed to get the 3.5 inches of water into the soil should be used, and when this stream reaches the far end, it should be reduced to a point where it supplies water the entire length of the row.

This lesser stream should then be applied long enough to complete the irrigation application.

• **Deep, Fine-textured Soils**—These take water fairly slowly but absorb water considerably better than the first group. These soils hold about 1.7 inches of water per foot of depth, available for crop use; but are more open and, consequently, the root development is deeper, generally about four feet. The four-foot depth would hold 6.8 inches of water. Again irrigating when one-half of the water is still in the root zone, we would need to replenish about 3.4 inches of water. Mature cotton on this soil would again need about .23 inch per day, so we need to apply irrigation water about every 15 days during the season of highest moisture demand.

A good irrigation system 75 percent efficient would cause us to apply 4.6 inches of water to replenish the 3.4 inches needed for crop growth. These soils take water more readily, making it necessary to use shorter rows. Therefore to obtain good irrigation, the rows should be a maximum of about 1,000 feet long with a maximum grade of about two and one-half inches per 100 feet.

• **Deep, Medium-textured Soils** — These soils take water readily. They are commonly referred to as our mixed land soils and are probably our best soils for general irrigation use. They will store about 1.5 inches per foot of depth, but cotton roots penetrate them rather readily unless inhibiting factors, such as plow pans, are present. The root development will generally occur to a depth of about 4.5 feet; therefore moisture stored to this depth would be approximately 6.8 inches. Moisture to be returned to the soil would be 3.4 inches each irrigation. The maximum moisture use by cotton on this soil would be about .22 inches per day; therefore, we would need to irrigate about every 16 days during the period of heaviest crop growth.

If our irrigation system is 75 percent efficient, we will need to apply 4.6 inches of water to the rows. These soils take water rather rapidly and if we are to obtain good penetration at the far end without excessive penetration at the end nearest the turnouts, the maximum row length should be approximately 600 feet and maximum grade approximately three and one-half inches per 100 feet.

• **Moderately Coarse-textured Soils** — Another group of soils consists of the moderately course-textured soils which take water rapidly. They will store about 1.4 inches of water per foot of depth. They have root depth of about 4.5 feet and require about 3.0 inches of moisture to be replaced each irrigation. Cotton plants on these soils will use about .23 inch of moisture per day, so that irrigation frequency will need to be about every 13 days. Because of the rapidity with which they absorb water, the maximum length should be about 400 feet and the maximum grade about four and one-half inches per 100 feet. A system operating 75 percent efficiently would require applying 4 inches of water each irrigation.

• **Coarse-textured Soils**—Cotton on these soils has a root depth of about 5.0 feet. Net moisture to be replaced is about 2.3 inches. The cotton will use about .25 inch per day, so the irrigation frequency will need to be about every nine days. These soils are impractical for row irrigation, due to the very high intake rate of the soils, and usually are watered by the sprinkler method.

• **Shallow Soils** — The last group of soils consists of the shallow soils which have a depth of less than two feet for root development. They, therefore, are not suited for cotton production. Shallow soils are not too productive, so it is questionable as to the economic justification of irrigating them. If they are to be irrigated, they should be planted to shallow-rooted crops.

If farmers will irrigate their cotton crops in accordance with their individual soil needs, will maintain their soil fertility through use of a good conservation cropping plan, and use fertilizer according to the needs of the soil, the drop in yields commonly experienced by new irrigation farmers can be avoided.

Legislation Controls Rash Criminal

Massachusetts made common knowledge a law recently when it declared poison ivy a "public nuisance."

The Eastern legislature is following the example of a number of western states where control of "noxious weeds" is the legal responsibility of the property owner —and the law can be enforced.

Eradication of poison ivy is first up to the land owner. If he does not get the job done, then the town can step in through its municipal control and local gypsy moth control authorities. The moth control superintendent can destroy the public nuisance and bill the owner, though charges for poison ivy clean-up cannot be in excess of one half of one percent of the property's assessed value.

Actually, killing a good-size patch of poison ivy may not cost as much as the doctor and drug-store bills for one moderately severe poison ivy attack.

Louisiana Group Protests Egyptian Dam Project

Louisiana Delta Council has registered a strong protest with Secretary of Agriculture Benson and state congressional delegation regarding U.S. participation, financial and otherwise, in the proposed construction of the Aswan Dam on the upper Nile River in Egypt.

A recent announcement reveals that the U.S. and Great Britain have assured Egypt that they will contribute to the cost of the $1.3 billion project. Unofficial sources indicate that joint U.S.-British financial assistance will include grants of $200 million plus $200 million loan from the International Bank, primarily financed by America.

Council Secretary Harvey P. Grant, Jr., Delhi, states: "It is estimated that upon completion, the Aswan Dam will irrigate more than two million acres of now arid desert land. We fear that much of this acreage will go into the production of cotton. Such increased foreign acreage will greatly nullify and hamper efforts of our cotton farmers who are planting drastically curtailed acreages in an effort to reduce the present cotton surplus. Many of our present-day American cotton problems are the result of our government's financial and technical aid to increase the production of foreign cotton."

New Mechanical Picker Developed in Arizona

A cotton picking machine using the suction method is being tested in the Gila River area of Arizona by Harold Burdett of Hub Manufacturing Corp., Phoenix. While the machine still is in the experimental stage, the Harris Cotton Ginning Co. at Chandler handled 3,960 pounds of cotton and reported only 70 pounds of foreign matter, according to The Arizona Farmer-Ranchman.

Burdett has patents pending and expects to have more machines in operation next season.

New Vegetable Oil Refinery

Honeymead Products Co. is building a complete vegetable oil refinery at its soybean mill at Mankato, Minn. The refinery will have a capacity of 360,000 pounds of finished products daily, and early stages of the construction are expected to be in production by spring.

• Midsouth Mills Help Livestock Program

MILLS of the Midsouth area are aiding efforts to use diverted acres and encourage livestock production through their cooperation with the Dixie National Fat Cattle and Feeder Calf Show, held during the fall in Memphis.

C. E. Garner, secretary of the Valley Oilseed Processors' Association, and Dalton E. Gandy, field representative of the National Cottonseed Products Association, have worked closely with the mills and show officials in the program.

An important result has been to encourage the use of cottonseed meal and hulls in balanced rations for fattening cattle, and many small and large feeding operations have developed in the Midsouth area.

The following oil mills and their managers cooperated by contributing cottonseed meal, pellets or cake as special awards to livestock producers exhibiting at the show: Arkansas—Swift & Co. Mill, Blytheville, James E. Dicks, manager; Forrest City, Forrest City Cotton Oil Mill, Forrest City, James Hickey; Helena, Helena Cotton Oil Co., Joe Brady; Osceola, Osceola Products Co., Ralph Woodruff; West Memphis, West Memphis Cotton Oil Mill, F. H. Ferrell.

Mississippi—Tupelo, Tupelo Oil Mill and Gin, J. A. Strain, manager; Tunica, Planters Oil Mill, C. E. White; Crenshaw, Crenshaw Oil Co., T. C. Potts; Clarksdale, Planters Manufacturing Co., A. K. Shaifer; Marks, Riverside Oil Mill, Wm. King Self; and Corinth, Buckeye Cotton Oil Mill, A. J. Vaughan, Jr.

Tennessee—Dyersburg, Dyersburg Oil Mill Co., M. K. Weakley, manager; Jackson, Independent Oil Mill, F. B. Caldwell, and Jackson Cotton Oil Mill, Hoyte Martin; Memphis, Buckeye Cotton Oil Mills, T. F. Horn and R. H. Norris; Chickashaw Oil Mill, C. W. Hasen; DeSoto Oil Co., I. H. Fleming, Jr.; Memphis Cotton Oil Mill, M. D. Parker; Perkins Oil Co., T. C. Lee; Southern Cotton Oil Co., W. K. Martak; and Swift & Co. Mill, E. C. McGee; Tiptonville, Lake County Oil Mill, P. T. Pinckney; and Trenton, Trenton Cotton Oil Co., R. F. Patterson.

Later Date for Planting Cotton Set in Valley

Feb. 1 has been set as the first planting date for cotton in the Lower Rio Grande Valley of Texas under pink bollworm quarantine regulations, Texas Commissioner of Agriculture John C. White has announced. This 1956 initial date compares with Jan. 20 a year ago. Plow-up deadline for the area is Aug. 31, and the final planting date is March 31.

The later date is designed to reduce the likelihood of insect infestation and White's action has been praised by a number of cotton leaders.

"That is good," commented F. Earl Davis, crusher and cotton producer of Harlingen. "We have been wanting that date a long time, but there was no use doing anything about it unless Mexico would go along. Mexico has now agreed to abide by the later planting date. If Mexico planted earlier and we didn't it would mean insects would just move over on our young cotton and we wouldn't gain a thing."

The Feb. 1 planting date in Zone 1 is the earliest permissive period among counties subject to the Texas Agriculture Department pink bollworm control regulations.

Planting and plow-up dates announced for other zones follow:

2. Planting Feb. 15-April 30; plow-up Sept. 25. Counties include Kleberg, Nueces, San Patricio, Jim Wells, Brooks and Duval.

3. Planting March 5-May 10; plow-up Oct. 10. Counties include Bexar, Kinney, Val Verde and Uvalde.

4. Planting March 10-May 20; plow-up Oct. 20. Counties include Brazoria, Galveston, Chambers, Jefferson, Orange, Liberty, Harris and Washington.

5. Planting March 10-May 20; plow-up Oct. 20. Counties include Travis, Hays and Williamson.

6. Planting March 20-May 31; plow-up Nov. 30. This is the first year that Zone 6 counties have had planting dates set by law. The counties are Burnet, Burleson, Bell, Milam, Falls, Robertson, Brazos, Leon, Madison, Grimes, Montgomery, Walker, Houston, Trinity, San Jacinto, Polk, Angelina, Tyler, Hardin, Jasper and Newton.

7. Planting April 1-May 31; plow-up Dec. 15. Counties include Coryell, Hill, McLennan, Limestone, Navarro, Ellis, Henderson, Freestone, Anderson, Smith, Cherokee, Rusk, Nacogdoches, Panola and San Augustine.

Insect Resistance No Cause for Alarm

Apparent resistance to insecticides shown by boll weevils in some areas during 1955 is no cause for alarm, and should not cause any cotton producers to lessen their efforts to control insect pests or fail to use the recommended insecticides next season. This fact was emphasized by many of the entomologists attending the first annual Beltwide Cotton Production Conference, which is reported in detail throughout this issue.

Conditions which prevented the usual effectiveness in control of weevils in some areas during the past season could have been influenced by many factors, authorities pointed out. "We must not lose faith in our proven insecticides and insect control practices," said Dr. F. C. Bishopp, longtime cotton entomology leader who discussed the problem on the meeting program.

• Farmers Join Oklahoma Science-Industry Push

OKLAHOMA farm and ranch leaders have joined the statewide push for teaming science and industry.

The objectives are (1) to increase manufacture of farm machinery in Oklahoma, and (2) to up the processing in the state of Oklahoma farm products.

State department of commerce and industry's advisory board, the Oklahoma Economic Development Commission, is the springboard for the venture. At a recent meeting, Dr. A. E. Darlow, vice-president of Oklahoma A&M College, reminded 85 farm leaders that most of the state's farm products were being shipped out of state for processing and returned to Oklahoma for consumption.

• Texas Consolidates Cotton Testing

COTTON FIBER testing facilities of the Cotton Research Committee of Texas formerly at the University of Texas have been consolidated with those at Texas Technological College, Lubbock, effective Jan. 1.

K. Lanse Turner, director of the committee, said that no change was made in the personnel of the organization, and that the same services will be rendered to the industry as in the past.

Turner said that the decision to consolidate laboratory factilities was made by the committee composed of the heads of the University of Texas, Texas A. & M. and Texas Technological College, the three institutions that conduct research through state funds provided for the Cotton Research Committee of Texas.

Burris C. Jackson, Hillsboro, has been appointed chairman of an industry advisory committee that will review periodically the work of the cotton units and receive progress reports. This advisory group met in Austin during December and is scheduled to meet again during January.

Committee members include Horace Etchison, ginner, McAllen; R. O. Beach, cotton merchant, Houston; Elliott Knox, textile manufacturer, New Braunfels; E. C. Cox, cotton fiber testing laboratory, Dallas; Dr. Earl E. Berkley, research laboratory, Houston; Roy Forkner, ginner, Lubbock; Aubrey Lockett, seed breeder and ginner, Vernon; W. D. Watkins, cottonseed crusher, Abilene; Jack J. Stoneham, cotton merchant, Dallas; and Otto Goedecke, cotton merchant, Hallettsville.

Streptomycin Eradicates Sesame Leaf Spot

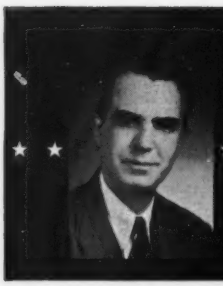
Antibiotic streptomycin has successfully controlled bacterial leaf spot on sesame. USDA scientist C. A. Thomas said that streptomycin actually eradicated the disease organism. Naturally infected sesame seed of Palmetto variety were soaked for 30 minutes in water with 250 parts per million of streptomycin, and planted in isolated plots in Maryland and Virginia for comparison with untreated plots. No leaf spot was found on the treated plants, but the blight was common on the untreated.

(Palmetto is a new, nonshattering variety of sesame developed at Clemson, S.C., through cooperative research activities of South Carolina, USDA and National Cottonseed Products Association. Limited amounts of seed are expected to be available for planting in 1956.)

USDA Forecasts Expanding Japanese Soybean Market

A recent USDA study indicates there is a good possibility of maintaining and expanding our large Japanese soybean market, provided that market's special demands are met.

Soybean consumption in Japan is almost entirely as human food and producers and exporters will have to keep this in mind if they want Japan to contine to be the biggest importer of U.S. soybeans. U.S. soybean exports to that country in 1954-55 totaled 20 million bushels, valued at $56 million.



from our Washington Bureau

by FRED BAILEY

WASHINGTON REPRESENTATIVE

The COTTON GIN and OIL MILL PRESS

• **Lint Program Changes** — Important changes in cotton programs and policy are getting top consideration in congressional and administrative thinking in Washington. The four general areas to watch most closely are:

• **1. Support Rates and Provision**—It is pretty much a foregone conclusion that cotton support rates will be lower in 1956. About the only question is: By how much? Theoretically, Secretary Benson has legislative authority to drop supports to 75 percent of parity. Full flexibility—75 to 90 percent of parity—becomes effective Jan. 1.

He will use that authority to increase his bargaining power when he goes to Congress to discuss new cotton legislation. He could fix the loan rate at anywhere between 75 and 90 percent of parity.

What Benson wants is legislative authority to change the parity base for cotton from 7/8ths Middling to one-inch Middling, plus authority for wider "qaulity differentials" in establishing support rates. How much Benson is prepared to offer in the way of support rates for that authority has not been revealed. He may offer a support rate of somewhere around 82.5 to 85 percent of parity, with the one-inch base.

The choice Congress might have to make would be between keeping the 1954 law in effect, or changing it to suit Benson. That assumes that Benson has the power to persuade the President to veto a bill he doesn't approve.

Under which alternative would farmers be the better off? If Benson lowers supports to 75 percent of the modernized parity formula and holds to the 7/8ths-inch Middling, supports would drop by about 6.5 cents a pound, or to about 27 cents in 1956.

Modernized parity will call for a drop of about one cent a pound, no matter which method is used. So, even if Congress does nothing and Benson should hold supports at 90 percent of parity—which is not probable—the base rate next year would be 32.5 cents per pound.

We look for supports at 82.5 percent of parity, or perhaps a bit higher, but not over 85 percent. Assuming supports at 82.5 percent, we get, compared with 1955, a reduction of 2.8 cents. Add another 2.7 cents for change in the base and one cent for the switch to modernized parity and we arrive at a probable figure of around 27 to 28 cents as the support rate for 1956.

Benson is in a strong bargaining position. If Congress fails to amend the law, he can cut the support rate to 75 percent of parity. Congress knows that, and will try to bargain with him for as high a rate as it can get, this being an election year.

• **2. The Soil Fertility Bank**—One of the objectives back of that proposal is to take two to three million more acres out of cotton and put them into grass and trees. No one here pretends that, with normal weather, the small acreage cut in 1956 would have much effect on total cotton production.

Almost everyone here favors a "soil bank" approach, but there is no agreement on provisions. Everyone, it seems, has a different idea on how it would work. Big questions are: How would payments be made, and what restrictions would be made on use of the land "diverted"?

One method of payment, backed by the Farm Bureau, would call for "payment in kind" on acres taken out of cultivation. That is, farmers who take land out of cotton would be given a certificate entitling them to so many bales from the CCC stockpile. The number of bales would be less than the normal production on the acres taken out.

• **3. An Intensified Export Program**—It will require more intensive sales promotion, plus price cutting, just to hold the cotton export total at the figure of last year, around 2.5 million bales. Competition from other growing areas is becoming stiffer.

During the past year, USDA paid out almost $300 million in subsidies, in one form or another, to finance exports of 1.5 million bales. Forty-two percent of all cotton exports were subsidized.

Authorizations for financing cotton exports this current season total $340 million. That is expected to include approximately two-thirds of all cotton exported.

Benson hopes to expand exports through a bid basis for certain grades of cotton that are in excess supply, but there has been no abatement of State Department opposition to what Dulles calls "dumping."

At last report, CCC owned 6,336,412 bales of upland cotton and had loans on another 3,254,601 bales. Total holdings are expected to exceed 10 million bales within a few weeks, if, indeed, they are not already in excess of that figure.

• **4. Ceiling on the Size of Loans**—This proposal is widely backed as a good "vote-getting" idea in an election year, but proponents are cautious about advocating it publicly at this time. Most of the talk has mentioned a $25,000 ceiling on the amount of loan to any one producer. That applies to all crops, not just to cotton.

Argument advanced is that (1) support programs have helped big growers get bigger, and (2) big producers are more efficient anyway, and so could grow cotton at a lower price.

Doing "something for small farmers" is going to become very popular in the coming session of Congress. Administration officials are not inclined to oppose something of the sort. Anyway, there are lots more votes cast by small than by large farmers.

Big drawback is that such a program would be hard to justify from a price-supporting viewpoint. Too, big farmers have ways of bringing pressure to bear on their congressmen.

While the above are the four areas to be watched most closely, the field is wide open for new cotton legislation. And the battling over cotton may be the first and the hottest farm issue in the new Congress.

• Carolina Girl Named Maid of Cotton

AN INVITATION ONLY audience saw the 1956 Maid of Cotton crowned world ambassador of the cotton industry Dec. 28 in Memphis.

A North Carolina lass, Patricia Anne Cowden of Raleigh, and her two alternates, Revis Jordan of Lubbock, Texas, and Minta Curtis of Mission, Texas, were named by a seven-judge committee.

The new Maid is Miss Raleigh of 1955. A brownette, she is 22, has green eyes, stands five-feet seven and one half inches and weighs 125 pounds. She is a private secretary in the Security National Bank in Raleigh.

Miss Cowden succeeds De Lois Faulkner of Sallisaw, Okla.

The 1956 Maid flew Dec. 29 to New York City, where top designers will outfit her with the latest cotton finery. She will model an elaborate wardrobe on a six-month international tour which will take her to Europe, South America and most of this country's major cities.

When she returns a new convertible automobile will be waiting in Memphis. She keeps her wardrobe, too.

Selection of the winner climaxed two days of judging of the bevy of Cotton Belt beauties in private interviews and a round of public appearances.

Cotton Standards Changes Are Proposed by USDA

Details of a USDA proposal to change official cotton standards for certain staple lengths were published Dec. 29 in the Federal Register. The proposal involves certain lengths below 13/16 inch and designations for lengths of 1 9/32 and 1 11/32 inches. Details are available from USDA's Cotton Division and arguments regarding the proposal may be filed with the Division within 30 days after the announcement.

• Flippin Promoted, Succeeds Wilson

W. R. FLIPPIN, Memphis, who has been division manager of Buckeye Cellulose Corp., has been appointed manager of general seed and bean buying and local product sales of the Buckeye Cotton Oil Division, effective Jan. 1.

He succeeds J. O. Wilson of Atlanta who is retiring after 36 years with the firm.

The company also announced plans to move the general seed and bean buying department from Atlanta to Memphis.

Flippin has been with Buckeye 26 years and is widely known throughout the oilseeds processing industry. He is active in the Memphis Board of Trade and other civic and business organizations.

• Farm Bureau Cotton Program Listed

A COTTON PROGRAM, aimed at meeting long-range, as well as short-range, problems faced by cotton farmers, has been approved by the American Farm Bureau Federation's board of directors. Points of the program are:

Immediate action by the U.S. government to regain and hold our share of the cotton export market.

Further reduction of the surplus by offering farmers negotiable options to buy CCC stocks of cotton at reduced prices for voluntarily reducing their cotton acreage below their individual allotments.

Improved balance between supply and demand of various qualities of cotton by basing the support level on the average quality of the crop and adjusting loan differentials to reflect true market relationships as between individual qualities.

A greatly expanded research program, both publicly and privately financed, to reduce costs and improve quality.

To explore and attempt to develop an improved price support program for cotton which would reflect increased efficiency of production so as to better meet price competition.

Negotiation of agreements with countries increasing textile exports to the U.S. to the end that our imports may not be increased to the point where they seriously affect the U.S. cotton industry. In the event that satisfactory agreements cannot be reached, action should be taken under Section 22 of the Agricultural Act to deal with cotton textile import problems.

Mandatory labeling of textile products to show clearly fiber content.

Compensating producers with CCC cotton for further voluntary reduction of their cotton acreage is to be fitted into an over-all soil bank program. The board also took the position that in view of the large cotton surplus, any increase in national acreage allotments for 1956 would be totally impractical, and opposed change in the marketing quota from the present acreage to poundage or baleage basis.

Cotton growers and others interested in cotton will meet in Memphis Jan. 6 to discuss this program, Tom J. Hitch, Columbia, president of the Tennessee Farm Bureau, has announced.

Tennessee, Mississippi, Arkansas, Missouri and Louisiana will be represented at the meeting, to be held at the Claridge Hotel.

Among those attending will be Charles Shuman, president, and John C. Lynn, legislative director of the American Farm Bureau Federation.

They, along with state presidents and representatives of the National Cotton Council, will answer questions.

Arizona Growers Pleased With Soybean Results

Results with soybeans in Arizona during 1955 have been gratifying to producers and are expected to encourage increased production next season, according to The Arizona Farmer-Ranchman.

A survey of about 500 out of an estimated 2,000 acres this season showed an average yield of 2,000 to 2,500 pounds per acre. About 60 percent of the growers surveyed expect to plant more beans in 1956, and 29 percent expect to plant about the same acreage.

Meat Output to Exceed '55 All-Time Record

Meat output, which set a record in 1955, is expected to be even larger in 1956, according to American Meat Institute. Production during the past 12 months is estimated at 26.8 billion pounds.

The 1955 total topped the previous year's record of 25.3 billion. The per capita consumption of 161 pounds in 1955 was second only to the 163.3 pounds in 1908. Most of the rise was in pork, which amounted to approximately 11 billion pounds in 1955 as compared with about 10 billion the year before. Per capita consumption of pork rose from 59.7 pounds to 66 pounds in the year.

Production of beef rose about two percent, from 13 billion pounds to 13.6 billion, in 1955, and beef consumption per person reached a record 81 pounds from 79.2.

Consumption of pork per person in 1956 may rise about a pound, he predicted, while beef is expected to be about two pounds lower and veal, lamb and mutton off small fractions. This would make for a slight reduction in the per capita consumption to around 160.5 pounds, but the larger population factor accounts for the predicted larger total meat production of 27.2 billion pounds.

■ **ROBERT H. PEEBLES, plant breeder and superintendent, USDA Field Station, Sacaton, Ariz., is leaving after 32 years to work in Washington with USDA. DR. BILLY WADDLE succeeds him.**

• Eight-Year Average Yield Two Bales

MORE THAN two bales per acre has been the average yield of H. G. Bradley's farm near Pecos, Texas, for the past eight years, and his yield has not dropped below this two-bale figure in any of these years.

Some of his acres make three bales each and his yield approaches four bales per acre at times, according to ACCO Press. Bradley's acreage ranges from 320 to 1,500 acres per year.

Bradley irrigates his crop from wells, dug to depths of 400 feet or more. One of his wells produces 3,000 gallons a minute and is pumped with a 400-horsepower engine. He estimates that it would cost $20,000 to duplicate that well today.

In the Pecos area 1517C and Pima S-1 are the main cottons raised. "We raise the extra long staple Pima to try to keep up with the latest types of cotton. We don't want to get left behind when something new comes up," Bradley says. They raised some 640 acres of Upland and 240 acres of Pima this year. Bradley and his sons have been raising Pima for the last eight years, whether there was a support price or not.

• **Uses Good Seed** — The first rule of the Bradleys for profitable planting is the use of good cottonseed. "You can't get cotton any better than the seed you put in the soil," Bradley says.

He used 30 pounds of delinted seed to the acre. Six to eight pounds would be enough to get a good stand of cotton, if the weather were ideal. But Bradley is one man who believes it is easier to chop cotton down than to get it up. "I'm just gambling a few seed to make sure we get a good stand of cotton," he says.

Before planting the cotton, 100 pounds of anhydrous ammonia is drilled into each acre of cotton land. Then, just before watering, 300-400 pounds of 20 percent phosphate is broadcast over the soil.

Bradley believes in fertilizer and the results it gives. "We easily get back all the money we invest in fertilizer," he says.

"Later in the growing season I side dress with 50 pounds of anhydrous ammonia. And if the cotton looks like it needs more, I apply another 50 pounds. Sometimes when the cotton starts fruiting I use some ammonium sulphate to jolt it along. Later I put nitrogen in the irrigation water to keep the cotton growing." Bradley says he's not completely sold on this practice, but likes to keep the bolls on the cotton. This is the only way he knows to get fertilizer to the plants at this stage of growth.

The Bradleys' upland cotton will yield over two bales to the acre. The staple is running from 1-7/32 inch down. It seldom gets below 1-1/16; the majority being between 1⅛ and 1-5/32 inch.

The Pima cotton, mostly 1-7/16 staple, will yield about a bale and a half to the acre.

• **Expensive** — "Some people don't realize how expensive it is for us to raise cotton here," Bradley says. My biggest well has a pump that cost a flat $10,000. And we have three big tractors. The last one of these cost $13,000. When I started farming, it was hard for me to round up $300 to make the down payment on a tractor; now, we find a small tractor worthless here. That $300 would be a drop in the bucket in a farm operating in the Pecos area because we need big equipment. I would guess that we have to make a bale and a half to the acre to break even."

Fertilizer Tonnage Drops; More Nutrients Used

Farmers used more pounds of plant nutrients but fewer total tons of fertilizer in the 1954-55 crop year, National Plant Food Institute reports. The 20,518,180 tons of fertilizers consumed were 1.52 percent below the 1953-54 tonnage, but the third largest total on record. Because of the higher plant food content of fertilizers used, the consumption was up in terms of nutrients during the past season.

North Carolina retained first place as the leading state in fertilizer tonnage, followed, in order, by Georgia, Florida, Indiana, California, Alabama and Ohio, each using over one million tons.

• Council Techniques Studied Abroad

HOW market research techniques of the National Cotton Council are being studied by foreign textile industries as a step toward increasing demand for cotton goods in other countries will be described at the Council's annual meeting in Biloxi, Jan. 30-31. Other developments of wide interest to members of the cotton industry will be outlined at the meeting, to be attended by leaders from throughout the Cotton Belt. General sessions will be held at the Buena Vista Hotel. Meetings of committees, caucuses of industry groups and other meetings will be held in conjunction with the general sessions. Details of plans for the meeting will be announced in the next issue of The Press.

Heart Attack Fatal for Ralston Purina Head

William H. Danforth, 85-year-old founder and board chairman of the Ralston Purina Co., died of a heart attack at his home in St. Louis on Christmas Eve.

He died as he and his family waited for the arrival of Christmas carolers. Danforth was president of the National Christmas Carols Association. As a philanthropist, he had donated funds to colleges for chapels and teaching scholarships through the Danforth Foundation.

Arkansas Ginner Dies

Earl C. Kiech, Nettleton, Ark., ginner, died recently as a result of a heart attack. Friends throughout the industry extend sympathy to his survivors, his wife, son and two daughters.

■ **CHARLES SIGNOR, ROY FORKNER, WAYNE PRATHER, D. C. PRINCE, and JAMES TAYLOR have been named on committees planning the 1956 South Plains Maid of Cotton Contest.**

Photo: Courtesy Texas Cottonseed Crushers Assn.

Good Picking Practices Pay Producers

GOOD AND BAD PICKING PRACTICES are contrasted in these two scenes. Pickers crowding around the truck or trailer and tramping cotton in it waste seed cotton, add to the problem of ginning and hurt the grade. In contrast, on the right, is a clean load of cotton in a trailer handled so that the pickers stay out and trash is not ground into the seed cotton. Good cotton, properly handled, has been worth as much as $30 to $40 per bale more this season.

• Swift Has Eight Memphis Units

SWIFT'S operations in Memphis, where the firm has eight separate units, were the subject of an article recently in the Memphis Commercial Appeal.

Memphis operations of Swift & Co. include the oil mill, oil mill division office, ice cream plant, feed store, grocery sales unit, zone purchasing department and a refinery.

More than 1,000 persons are employed, with the oil mill's 125 employees leading the list. The refinery, built in 1902, was the first Memphis installation of the firm. The oil mill has been in operation since 1919.

October Margarine Sales

Household margarine purchases for October, 1955 were smaller by one million pounds than in October, 1954, but for the April-October 1955 period sales were seven percent larger than for this period in 1954.

Butter sales in October, 1955 were three million pounds above the 1954 total, but in the April-October 1955 period was only six percent greater than the corresponding period a year earlier.

Both the price of margarine and butter were down from last year. Margarine average price was 24.7 cents a pound, down one-half cent from 1954.

• Bees Pollinate New Cotton Hybrid

THE FIRST HYBRID cotton appears to have been produced by two research workers of USDA in Arizona through the use of bees to pollinate the variety.

Researcher R. H. Peebles estimated the increase in the crop's cash value at about $29 per acre higher than regular varieties if hand picked and $34 if harvested by machine.

The new hybrid, as yet unnamed, was developed in 1954 by Peebles and S. E. McGregor, who work out of the U.S. Beekeeping and Insect Pathological Laboratory in Tucson.

They first produced the new hybrid from two varieties of long staple cotton, Pima S-1 and Pima 32, in 1954, and tested it in seven plots around the state in 1955.

Peebles said no plans have been made for commercial production of the hybrid seed. They are leaving that up to cotton growers.

Surplus Grain Aids Needy

Surplus feed grains will be donated to assist needy farm families in specific disaster areas, USDA has announced. CCC-owned barley, corn, grain sorghums and oats will be furnished free to state agencies for distribution to farmers for livestock feeding. The feed will be used solely for maintaining livestock and the livestock and products cannot be marketed.

Australian Imports Rise

Imports of cotton by Australia during the 1954-55 marketing season were 88,000 bales, only slightly under the 92,000 bales imported during the previous season. USDA reports that imports from this country were up 40 percent to 54,000 bales.

Micronaire Standards Are Effective on Jan. 15

Official standards for fiber fineness and maturity of American upland cotton (under cotton futures provisions) have been announced by USDA.

The official standards for fiber fineness and maturity are the measure of such qualities, in combination, provided by use of the Micronaire instrument, model 606000, or other model used by the Department giving the same results.

The standards provide Micronaire determinations of fiber fineness and maturity, upon request, for cotton samples submitted to the USDA for certification for delivery on futures contracts. Such determinations are to be made in accordance with the new official cotton standards of the U.S. for fiber fineness and maturity of American upland cotton.

A person having cotton certificated may file a request for Micronaire determination at the same time classification for grade and staple length is requested or at any time within seven business days following the date of classification of the cotton. A receiver of cotton on futures may file a request for Micronaire determination any time within seven business days following the date of delivery of the cotton class certificates to him.

Owners of certificated bales which were classified as tenderable prior to Jan. 15, 1956, may file a request for Micronaire determination of this cotton at any time between Jan. 15 and Jan. 31.

Classified Advertising

RATES AND CLOSING DATES: Ten cents per word per insertion. Include your firm name and address in making word count. Minimum charge $2.00. Copy must be in our hands by Thursday morning of week of issue. Please write plainly.

Oil Mill Equipment for Sale

FOR SALE—2 French screw presses, complete with motor starters, 5-high ring stack cookers, individual steam traps, pressure gauges, etc. Only about 50,000 bu. soy beans have been processed through each since new. May easily be converted to cottonseed crushing. $17,000 for both units. Present replacement cost about $52,000.—Fayette Soybean Mill, Fayette, Iowa.

OIL MILL EQUIPMENT FOR SALE—Rebuilt twin motor Anderson high speed expellers, French screw presses, stack cookers, meal coolers, fourteen inch conditioners, filter presses, oil screening tanks, complete modern prepressing or single press expeller mills.—Pittock & Associates, Glen Riddle, Pa.

FOR SALE — Filter presses; screening tanks; single and twin motor Anderson Super Duo expellers, with conditioners; several extra 36" cooker dryers and conditioners. All steel linter baling presses; 141-176 saw linters; seed cleaners; No. 153 separating units; bar hullers; lint beaters; stack cookers; rolls; hydraulic press room equipment.—V. A. Lessor & Co., P. O. Box 108, Fort Worth, Texas.

FOR SALE—Anderson Super Duo expellers, each complete with 14" conditioner and 36" cooker; 5 high 60" ball bearing rolls. 176 and 141-saw Carver linters. 72" and 85" cookers. Butters milling machine. Double box linter press. Filter press. Attrition mills. Single drum hull beater. 42" Carver hullers.—Sproles & Cook Machinery Co., 151 Leslie St., Telephone PR-5958, Dallas, Texas.

Gin Equipment for Sale

FOR SALE—Cotton gins, oil mills, compresses and grain elevators. Contact M. M. Phillips, Phone TE5 8555, P. O. Box 1288, Corpus Christi, Texas.

ELECTRIC MOTOR SALE!

Rebuilt and New Ball Bearing Motors

3/60/220-440/2300 Volts

H.P.	Type	Speed		Price
300	Slipring	900		$3500
200	Slipring	900	New	3152
200	Slipring	720		2368
150	Slipring	900	New	2590
150	Slipring	900		1566
200	Sq. Cage	900		1481
150	Sq. Cage	900		1188
100	Slipring	1200		1076
100	Slipring	900		1189
100	Sq. Cage	1200		758
100	Sq. Cage	900		879
75	Sq. Cage	1800		490
75	Slipring	1200		889
75	Slipring	900		991
75	Sq. Cage	1200		564
60	Sq. Cage	1800		356
50	Sq. Cage	1800		290

All Sizes and Types Motors Up to 800 H.P. in Stock. LOAN MOTORS AVAILABLE AT NO CHARGE.

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FOR SALE — Conveyor distributors. One 5-80 Mitchell, one 5-80 Hardwicke-Etter, one 5-70 Lummus. Gins: 4-80 Continental Model C brush, 4-80 Cen-Tennial air blast with loose roll boxes and glass fronts. 5-70 Continental Model C brush with 30 fronts. 5-70 Lummus all-steel ball-bearing picker rollers. Driers: Two Murray big reel, two Lummus thermo cleaners, one 5-80 Mitchell. Bur machines: One Lummus 10' all-steel with 5-cylinder after cleaners, one 10' all-steel Continental, one Hardwicke-Etter 14' wood. Cleaners: Two Murray 52" V-belt inclined blow-in type, two Continental inclined 4-cylinder all-steel, one 6-cylinder Continental all-steel air line. Huller cleaner feeders: 4-80 Lummus LEF, 5-70 Lummus MEF, one Continental 4-X 80-saw, one 80-saw old style Super Mitchell. Condensers: Two 60" Continental all-steel side discharge, one Lummus 60" up discharge. Engines: One MM Twin six 210 h.p., one MM 240 h.p. 6-cylinder. Electric motors: Sizes from 20 to 150 h.p. 440 volt.—Bill Smith, Box 694, Phones 49626 and 47847, Abilene, Texas.

FOR SALE—Tower driers, automatic gas heaters. All types pipe and fittings, and used seed sterilizers.—Service Gin Co., P. O. Box 21, Ville Platte, Louisiana. Phone 4251.

MACHINERY FOR SALE—5-stand very late model machinery. Gin stands, feeders, distributors, condensers, lint flue and lint cleaners. All like new. Priced to sell.—P. O. Box 1048, Corpus Christi, Texas.

SPECIAL BARGAINS—As a year-end special, we offer, subject to prior sale, a complete 4-80 Lummus plant, less power, wagon scales and buildings. The essential items in this plant consist of 4-80 saw Lummus automatic air blast gins with lint flue, Lummus extracting feeders, 4-80 Lummus steel conveyor distributor with bale change valves, one practically new Lummus 9", 20' rotor lift, one Continental all-steel cleaning type two-trough drier with Continental heater, 4-cylinder steel Continental incline blow-in cleaner, four fans, Lummus up-packing press with steel Cameron tramper and horizontal triplex late model Lummus pump, all line shaft, pulleys, air pipe and all-steel late model Lummus up-draft condenser. Our price? Not $8,000, not $6,000, but a special give-away price of only $3,000. Better hurry! In our Waco stock, we have several nice all-steel cleaners, including a 1954, 72" Coutinental Impact, several steel bur machines, feeders, gins, pumps and hundreds of other items for your choice selection.—R. B. Strickland & Co., 13-A Hackberry St., Telephones: Day: 2-8141, Night: 3-7929, Waco, Texas.

FOR SALE—To be moved. One complete late-model, all-steel 5-80 gin, consisting of 5-80 glass front Murray gins. 5-80 special standard V-drive Mitchells. 5-80 submerged lint flue. 5-80 HardwickeEtter conveyor distributor. One 6-cylinder Hardwicke-Etter airline cleaner. One 16-shelf Hardwicke-Etter tower drier, fan and burner. One 5-cylinder Hardwicke-Etter V-drive blow-in No. 1 cleaner. One Hardwicke-Etter 3-way bypass. One 14' Hardwicke-Etter bur machine. One 5-cylinder V-drive No. 2 cleaner. One Hardwicke-Etter side discharge condenser. One Cameron ballbearing tramper. One Hardwicke-Etter up-packing press. One set Hardwicke-Etter seed scales. Two rotor lifts. One MM butane or natural gas engine. Fans on V-drive, all transmissions, etc. This is an extra good, clean gin at a bargain.—Bill Smith,Box 694, Phones 49626 and 47847, Abilene, Texas

Equipment Wanted

EQUIPMENT WANTED—We will buy several complete gin plants in the near future. Give us detailed description and price in first letter.—R. B. Strickland & Co., 13-A Hackberry St., Telephones: Day 2-8141, Night 3-7929, Waco, Texas.

WANTED—Offer solicited for used delintering machinery, modern and in perfect mechanical condition. Also linters press and accessories. Cheapest offers with fullest details please. Address to Box AR, c/o The Cotton Gin and Oil Mill Press, P. O. Box 7985, Dallas, Texas.

EQUIPMENT WANTED—Am interested in buying several gins to be moved. Must be of fairly late origin. Give exact description and price in first letter.—Bill Smith, Box 694, Phones 49626 and 47847, Abilene, Texas.

Power Units and Miscellaneous

FOR SALE—New and rebuilt Minneapolis-Moline engines, from 35 h.p. to 220 h.p., call us day or night for parts and service.—Fort Worth Machinery Co., 913 E. Berry St., Fort Worth, Texas.

FOR THE LARGEST STOCK of good, clean used gas or diesel engines in Texas, always see Stewart & Stevenson Services first. Contact your nearest branch.

FOR SALE—600 h.p. Cooper Bessemer gas engine, 400 r.p.m., 8-cylinder. In good shape.—Taft Cotton Oil Co., P. O. Box 218, Taft, Texas.

No Illness From DDT Doses Taken by Volunteers

Big doses of DDT taken daily for a year by human volunteers showed that food from insecticide-sprayed fields is safe, the American Association for the Advancement of Science was told Dec. 29 at an Atlanta meeting.

(Editor's Note: Other information on the subject of insecticides and possible food contamination is found in the Cotton Production Conference report of this issue.)

Some of the volunteers each day ate 200 times more DDT than the small traces that are known to appear in almost everyone's daily diet, the scientists said, but they showed no symptoms or "any sign of illness" related to the insecticide.

The study concluded that "there is a large safety factor associated with DDT as it now occurs in the general diet," even though it is true that some of the DDT we eat remains in our bodies.

• **Penta Not Hazardous** — At the same time as the DDT announcement, Monsanto Chemical Co. announced that its pentachlorophenol can be used as a preharvest desiccant on cotton without hazard to food or feed in the judgment of the Food and Drug Administration, according to recent word from that agency reported by the company's Organic Chemicals Division.

The dosage and timing of application proposed by Monsanto "will not result in any appreciable residue" in cotton food or feed products, the FDA is quoted as stating. The agency does not foresee any objection to such use of penta under provisions of the Federal Food, Drug and Cosmetic Act, Monsanto said.

The FDA opinon was the result of residue data compiled by Monsanto researchers from extensive studies including both greenhouse and field investigations.

Cotton Manufacturers Ask USDA for Import Quotas

Declaring that heavy imports of cotton products collide with and imperil the cotton support program of the U.S. the American Cotton Manufacturers' Institute on Dec. 29 petitioned USDA to invoke Section 22 of the Agricultural Adjustment Act and establish quotas on imports of cotton cloth and apparel.

The petition, which carries the endorsement of the Northern Textile Association, was presented to Secretary of Agriculture Ezra T. Benson. It pointed out that the importation of cotton goods into the U.S. is of such volume and growth as to injure seriously the domestic cotton economy and makes practically certain the acceleration of such injury.

• Lee Soybeans Doing Well in Arkansas

LEE, the new variety of soybeans released in 1954 for plantings in the South, did well in St. Francis County of Arkansas in 1955. County Agent G. J. Greene reports that growers are enthusiastic about the new variety.

Some of the growers of the county are William Wilkie of the Heth community who planted 21 bushels on 25 acres and produced an average yield of 47 bushels per acre. He will plant 400 bushels of this variety in 1956.

L. E. Burch of Hughes received a 45-bushel yield from a 20 acre block of Lee soybeans.

W. W. Draper, Jr. of the Lakeside plantation planted six acres from which he received 42.5 bushels per acre.

Israel Expands All Phases Of Cotton Industry

Israel's first commercial cotton crop of the August-July 1954-55 marketing year amounted to approximately 3,500 bales as compared with about 1,000 bales produced in 1953-54, and only nominal amounts in earlier years, USDA reports. Cotton acreage increased from about 2,000 acres in 1953-54 to about 5,700 acres, 1954-55. Plans for 1955-56 place planted area tentatively at 6,000 acres.

Cotton consumption was estimated at 28,000 bales, 1954-55 and 25,000 in 1953-54. Production capacity of seven existing cotton spinning mills was about stable in these two years, between 27,000 and 30,000, but nearly all plan expansion for the coming year.

Israel's cotton imports were reported at 22,000 bales in 1954 and at 13,000 the first six months in 1955. U.S. exports about 68 percent of these totals, amount-to 15,000 bales in 1954 and 8,600 in the latter period. Turkey supplies the next biggest block of Israel's cotton imports, 25 percent.

• More Castor Beans Expected in 1956

CASTOR BEANS may be more attractive to farmers as a crop to go on diverted acres in 1956, according to Baker Castor Oil Co., a leading processor of the crop.

Prices recently have gone up from a low of 5.5 cents per pound to around 7 cents, clean basis, delivered to New Jersey plants.

Production costs also appear likely to decline as a result of better varieties, improved equipment and better cultural knowledge, the firm reports. About 14 of the new model of the Boardman harvester-hullers are now in use, and USDA research engineers have designed a two-row harvester-huller on a John Deere reversed tractor and cotton picker frame.

Tanganyikan Competition

Government research and Extension work in Tanganyika Territory, British East Africa is presenting new competition for U.S. cotton. From 1945 to 1953 the cotton crop has averaged 50,200 bales of 400 pounds lint, but the 1954 crop more than doubled that figure, according to USDA.

Fiber Testing Classes

The first of four 1956 classes in cotton fiber testing will open in Clemson, S.C., Jan. 9, according to John T. Wigington, director of technical service for the American Cotton Manufacturers Institute, which conducts the classes. The classes are designed primarily for cotton mill technicians.

Medicated Feed Symposium

Medicated livestock feeds will be discussed at a symposium Jan. 23-24 in Washington, sponsored by the Food and Drug Administration. Information about the meeting is available from Dr. Charles G. Durbin, Food and Drug Administration, Washington 25.

Missouri Producers' Group Approves Cotton Program

Directors of Missouri Cotton Producers' Association have approved a short-term cotton program based on immediate steps to move at least 5,500,000 bales of cotton into the world market each year. A. L. Story of MCPA is a member of the committee of American Cotton Producer Associates which will present the program to the federal administration during January.

Austria Buys Less Lint

Austrian imports of U.S. cotton dropped 44 percent from 1953-54 to 1954-55, USDA reports. The 1954-55 volume was 28,000 bales.

The Vitamin We Use To See

HOW vitamin A and sight are related is a mysterious process, but this article tells some of the reasons that the ancients ate ox liver and honey in order to have better night vision.

VITAMIN A—the vitamin long familiar to the oilseeds processing industry because of its association with the margarine-butter controversy and with the use of cottonseed meal in livestock feeding—is called the "vitamin we see by" in a recent article from Better Vision Institute.

The relationship between vitamin A and vision is described as follows:

Normal eyes are 10,000 times as sensitive to light, after they've become used to a dark room, as they are in broad daylight. After you sit in a dark room for a while, your eyes can detect a light so faint that no known photo-electric machine will react to it.

Your eyes will acquire this ability to see in the dark in 6 to 10 minutes, after exposure to the light. That is, they will if they are normal eyes and if they have received a proper diet of vitamin A from food or from vitamin tablets. Otherwise, you will have to sit in the dark for perhaps an hour before your eyes become dark-adapted. Or they won't adapt themselves at all, in which case you are "night blind" — meaning practically stone-blind in darkness.

Dark adaptation is very important in our daily lives. The night-blind person is always banging himself up from falling over objects, and he is a deadly peril if he tries to drive a car after sundown.

• **Mysterious Process** — The process of dark adaptation is very complicated, and there is much that we don't know about it. In the first place, it is associated with those nerve-end light-receptors at the back of the eyeball that are known as "rods," from their shape. There are believed to be about 130 million of these rods. We use them to see in the dark, hence they are the night shift of visual workers.

During the daytime the other 7 million light receptors, known as "cones" from their shape, are on the job. Their work is very different, for they are able to send sharp, clear images to the brain—and more than that, colored images. Our sense of color resides in the cones. Rod vision, or night vision, is usually completely colorless and is dim in outline and foggy as to the distance of objects.

• **"Visual Purple"** — The rods, however, by no means provide a complete explanation of night vision. What makes the rods work in dim light, insofar as we know what makes anything work, is a mysterious substance known as "visual purple." Munch a raw carrot, or eat a fish liver (preferably raw), and you will add to your stock of vitamin A, from which visual purple is manufactured in the body. Better avoid the liver of the polar bear, which the Eskimos as well as their dogs reject. It is so full of vitamin A that it is poisonous.

Safer and more palatable sources of vitamin A are edible animal liver, vitamin-fortified margarine, eggs, butter, milk, cheese, salmon and yellow and orange-colored vegetables.

Visual purple, or "rhodopsin," seems to derive its power to stimulate the rod receptors, producing sight sensations, from its ability to change its form back and forth. For seeing purposes, vitamin A mysteriously combines with a protein, producing a whitish looking substance sometimes called "leukopsin." Under the influence of darkness (and who knows what else?) this compound takes on a yellow shade and becomes "retinene." A little more time, more darkness, and this visual yellow transforms itself into rhodopsin, purple or pinkish in color. Rhodopsin seems to have an affinity for the rod nerve-ends. There it congregates and resides.

It is pure "ammunition." When light hits it, it noiselessly "explodes." That is to say, it is bleached, back through yellow and white to vitamin A. The bleaching is judged to be an electrochemical process. It sets little electric currents to jumping along the optic nerve strands, carrying the sense of vision to the brain. Meanwhile, the bleached out material is reconstructing itself into yellow, then purple in order to do another seeing job.

Just how, or whether, this process is related to daylight seeing, over which the cones preside, is something we know little about. Authorities seem to agree that the process is similar, though not identical. The main difference seems to reside in our faculty for seeing colors. It is known that the cones, like the rods, contain pigments sensitive to light, and that they bleach under light.

• **Ox Liver and Honey** — Visual purple is a true miracle-child of the animal world. Freshwater fishes have a different kind of purple, and it is believed that some marine fishes go upriver to spawn in fresh water beceause they have a trace of this fresh-water purple in their eyes. The ancients knew nothing of visual purple, but they knew how to cure night blindness. Chinese, Egyptians, Greeks and Romans all ate liver for this purpose, and got prompt relief. The great physician Hippocrates recommended the raw liver of an ox, garnished with honey.

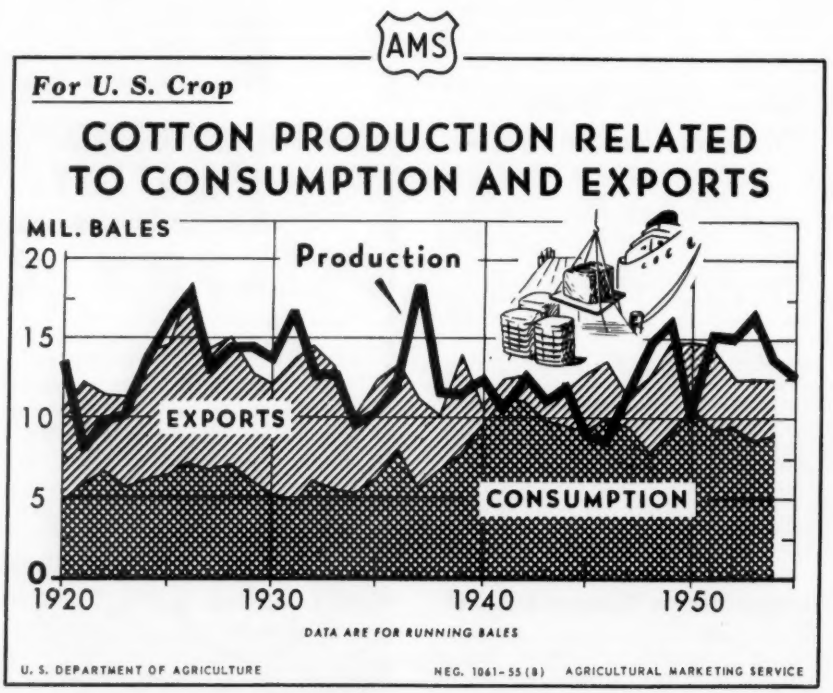
Night blindness is usually a symptom of vitamin A deficiency—though there is a form of this blindness which is a degenerative disease of the eye and has nothing to do with vitamins. Vitamin A deficiency can produce damaging and even disastrous effects on the eyes if not corrected. In the earlier stages, vitamin A is declared to be a sure cure.

Children, and especially those raised on a poor diet, are among the most numerous victims of vitamin A deficiency. Among grown-ups the condition has become important because the night-blind auto driver is a deadly hazard. Anyone who has trouble seeing in the dark had better get his eyes tested and set about stocking up his body on vitamin A.

Clothing Increases Bring Peak Yardage Demand

An increase in clothing expenditures due to booming business and rapid population growth has lifted "Sanforized" yardage to a new peak in the U.S. and 34 other countries in 1955. A still higher clothing demand is expected in 1956. Yardage with the "Sanforized" label was up 11.2 percent in 1955 over 1954.

Licensees of the trademark process cotton, cotton blends and linens to bring shrinkage within the required tolerance of one percent.



THE CAUSES of many of cotton's troubles are pictured in this USDA chart. From 1951 through 1954, production of U.S. cotton has been larger than domestic mill consumption plus exports, causing large carryover stocks to accumulate. Prospects for 1955 indicate only a slight reduction in carryover, if any.

• Soap and Glycerine Meeting Planned

THE IMPACT of automation, the continuation of our high-level economy, and research into buying trends for soap and detergents will be discussed at the annual meeting of the Association of American Soap and Glycerine Producers, Inc., Jan. 25-27, at the Waldorf-Astoria Hotel in New York.

The luncheon speaker on Jan. 26 will be the Eric Johnston, president of the Motion Picture Association of America, and formerly personal representative of President Eisenhower in the Near East. His topic will be "Who's Sabotaging Our Economy?"

The future of atomic energy as a peacetime force will be described by Dr. Lauchlin Currie, vice-president of the Union Carbide Nuclear Co. at noon on Jan. 27. At the same luncheon, recognition of the industry will be extended to Neil H. McElroy for his services as chairman of the President's White House Conference on Education.

The annual president's review of the year, will be presented by E. W. Wilson, vice-president of Armour & Co., Jan. 26. The state of national economy will be outlined by Dexter Keezer, economist for McGraw-Hill Publishing Co., New York. S. G. Barton, president of Market Research Corp. of America, will describe retail marketing trends of soaps and detergents.

The impact of automation on plant processing operations will be discussed Friday morning by Professor Ernest H. Schell of M.I.T. Automation as applied to office and marketing procedures will be covered by Dr. C. R. DeCarlo, director of applied science, International Business Machines Corp.

Edgar L. Burtis, of the Food & Agricultural Organization (FAO) of the United Nations will discuss world trends in production and use of fats and oils on Jan. 25.

Following this will be talks on the effects of textile and rubber developments on fatty acids by Emery I. Valko, vice-president of Onyx Oil & Chemical Co., and Donald Druesedow, development supervisor, B. F. Goodrich Chemical Corp., respectively. At the same time group meetings on industrial soap products for skin cleaning, building maintenance, dishwashing, and other specific fields will be held.

The convention will also include a meeting of the Glycerine Division at which Oscar P. Muller, National Lead Co., will talk on New Developments in Alkyd Resins; Max Wolf, Quartermaster Food and Container Institute, will discuss New Developments in Acetylated Glycerides; and Leo Pasternak will cover Foreign Trade and Trends in Glycerine. This takes place Thursday, Jan. 26. Following Thursday's business meetings, a fashion show to introduce the Maid of Cotton for 1956 and her washable cotton wardrobe, will be held on the Starlight Roof.

Workers in Agriculture Plan Dallas Meeting

"This Business of Agriculture" will be the theme for the annual meeting of Texas Agricultural Workers' Association at the Adolphus Hotel in Dallas, Jan. 12-13.

R. F. Hartman, Central Power & Light Co., Corpus Christi, is president of the organization of professional men and women in agriculture. Fred M. Shaw, Texas Research Foundation, Renner, is vice-president; V. S. Marett, Gonzales State Bank, is treasurer; and W. M. Burkes, Farmers Home Administration, Dallas, is treasurer.

Many entertainment features are planned in addition to business sessions, and Sam Houston State Teachers' College choral group will sing. All events of the convention are open to anyone interested in agriculture, President Hartman said.

Mullins Named Tennessee Specialist in Ginning

James A. Mullins became cotton ginning and mechanization specialist for Tennessee Extension Service on Jan. 1. His offices will be in Jackson, Tenn., and he is looking forward to getting acquainted as soon as possible with ginners throughout the state.

Greek Oil Imports Up

Allotted sales of cottonseed oil, soybean oil and lard to Greece have been increased an additional $158,500 by amending Purchase Authoriaztion No. 26-02.

The original authorization provided for the purchase of $2,272,000 worth of these commodities with shipment to be made prior to Dec. 1, 1955. Purchase of this quantity has been virtually completed.

Cotton Ginned to Dec. 13

The Bureau of Census reports the following number of bales of 1955 cotton ginned to Dec. 13, as compared with the following ginnings to the same dates in 1954 and 1953:

State	Ginnings (Running bales—linters not included)		
	*1955	1954	1953
United States	**13,703,820	**13,017,108	**15,164,851
Alabama	1,028,715	736,883	964,914
Arizona	521,092	746,444	852,887
Arkansas	1,572,994	1,329,745	1,468,498
California	1,031,191	1,269,953	1,431,188
Florida	14,763	16,265	13,796
Georgia	686,010	612,738	748,720
Illinois	1,477	2,628	1,656
Kentucky	6,955	8,159	6,454
Louisiana	564,308	560,505	776,501
Mississippi	1,937,205	1,555,251	2,074,976
Missouri	395,142	446,495	442,407
N. Mexico	224,274	283,932	283,880
N. Carolina	352,085	375,148	458,917
Oklahoma	432,841	285,901	407,588
S. Carolina	560,694	514,814	694,302
Tennessee	559,565	530,861	670,580
Texas	3,804,631	3,731,820	3,852,491
Virginia	9,878	9,566	15,096

* The 1955 figures include estimates for gins for which reports were not obtained in time for preparation of this report. Figures on cotton ginnings prior to Dec. 13 were collected by mail and reports were not received for all cotton gins at which cotton had been ginned.

** Includes 313,958 bales of the crop of 1955 ginned prior to Aug. 1 counted in the supply for the season of 1954-55, compared with 388,229 and 345,860 bales of the crops of 1954 and 1953.

The statistics in this report include 29,479 bales of American-Egyptian for 1955, 32,582 for 1954, and 47,028 for 1953.

The statistics for 1955 in this report are subject to revision. The revised total of cotton ginned this season prior to Dec. 1 is 13,058,671 bales.

Cotton consumed during November, 1955, amount to 741,447 bales. Cotton on hand in consuming establishments on Nov. 26, 1955, was 1,553,485 bales and in public storage and at compresses 16,607,483 bales. The number of active consuming cotton spindles for the month was 19,352,000. The total imports for the month of October, 1955, were 10,594 bales and the exports of domestic cotton, excluding linters, were 191,536 bales.

Cotton Production Conference

(Continued from Page 20)

tices do not entirely control the conditions favorable for boll rots, bottom defoliation may be helpful. Research has shown, as many of you know, that boll rots can be reduced significantly by this practice and that yields are increased proportionately. It goes without saying that complete defoliation at the proper time also reduces the opportunity for boll rots to develop.

Chemical Weed Control —Basic Approaches

DR. W. B. ENNIS, JR., Agronomist, USDA, State College, Miss.

MODERN WEED CONTROL has a set of requirements and disciplines that puts it into the category of a new agricultural science. At present, probably the most important aspect of this new science should be basic research concerned with gaining a better understanding of "how and why" of herbicidal action and the weed and crop reactions that occur under the varying influences of soils, weather and other factors.

Among the group of modern herbicides in commercial use, more studies have been conducted on 2,4-D than any other compound.

We know, of course, that 2,4-D has no place as an agent for controlling weeds in a growing field of cotton. Nevertheless, the research information obtained on this valuable herbicide was extremely important in devising principles for the first practical employment of other chemicals to control weeds in cotton.

• **Weed Aspects** — One neglected aspect of the overall weed control research program in cotton is the lack of proper effort to gain a better understanding of the weeds that present problems. This is particularly true in the instances of perennials and difficult-to-control annual weeds. It is important to remember that practical attempts to eradicate a weed pest may be nearly futile until its detailed life history is known. We need this fundamental information to develop sound principles of employing both chemical and cultural procedures to control weeds.

Soil and weather factors determine to some extent the success or failure of all herbicides currently available for use in cotton. Pre-emergence herbicidal treatments are especially subject to the vagaries of the weather. In the absence of any rainfall following treatment, poor weed control usually results. For this reason the usage of pre-emergence herbicides in the irrigated cotton of the Western United States has given poor results. It is common in the humid Southeastern U.S. to have moderate to excessive rainfall during the period when cotton is emerging or soon thereafter.

Under wet conditions, certain soil problems are presented as regards the safety with which a herbicide can be used on a crop.

There are a few instances where selected chemical agents have a sufficiently specific action that one kind of plant may be killed and another not affected. With present materials for use in cotton, however, maximum localization within the upper one-half inch of the soil is generally a prime prerequisite for the

most efficient control of annual weeds and for safety to the crop. Accordingly, more complete information is needed on the downward movement pattern and relative activity of herbicides in different soils under varying weather conditions. In addition, an understanding is required of how and why specific soil constituents may impede or fail to impede movement of herbicides in different soils.

• **Soil Chemicals** — No weed research program is adequate if it does not keep pace with the persistence of the chemicals in the soil. Present information indicates that the major losses of herbicides from soils are attributable to biological decomposition, leaching, and physical and chemical inactivation.

Probably the most important losses of herbicides from soils result from the activity of micro-organisms. Too little is known about the identity of the organisms responsible for decomposing different chemicals, their occurrence and distribution in different soils and areas, and the mechanisms whereby chemicals are inactivated by them.

The physical or chemical mechanisms whereby herbicides are held by certain soil constituents are not understood. What is the site of adsorption of herbicides in soils? Are herbicide molecules toxic when adsorbed by soil particles? What is the nature of the by-products of chemical decomposition or inactivation? These problems are worthy of the attention of persons with basic training in soil physics and soil microbiology.

Each promising herbicide should be run through an obstacle course that would measure its reactions to all the important weather factors (temperature, light, moisture, wind, etc.) Also, its reaction under the prinicpal soil conditions should be known. Following these hurdles, determinations of the "why and how" of any significant reactions should be made. For proper studies on weather factors there is dire need in the Cotton Belt for specialized facilities designed to simulate the different weather conditions that are known to occur.

As new principles of utilizing chemicals are developed, there is immediately a need for equipment designed to make the treatment according to specifications. The large variations in cotton acreages between farms in North Carolina and those of the Mississippi Delta pose tremendous challenges to persons responsible for application equipment development. It is possible that entirely new concepts of herbicide application may be required in order to provide satisfactory and economical equipment for the small farms.

• **Modifications and Shifts** — There is reason to believe herbicides will eventually be used on a majority of the cotton acreage as a regular production practice. In the transition from limited to widespread use of herbicides, modifications and shifts in some of our present practices may be required. For example, if weeds are eliminated it is possible improvements can be made in the placement of fertlizers. Irrigation techniques may be modified to insure proper action of herbicides applied to control weeds. The need for cultivations after planting may be virtually eliminated on many fields. These and other potential developments will present problems to challenge the best efforts of our research engineers.

Economic aspects in the final analysis determine the future of new practices. They offer a challenge to the research men in both private and public agencies to develop procedures that are increasingly attractive from the economic standpoint. Sound economic studies are needed on each new development before it is generally recommended for farmer usage.

Finally, new developments in weed control or other practices that offer greater efficiency and economic returns to cotton farmers must be made known to them as rapidly as the soundness of the development warrants. This requires a well organized, hard hitting program designed to reach all farmers. There are established channels in the state and federal Extension programs for this service as well as through vocational agriculture workers.

But this field must be strengthened if farmers are to be assisted properly in adopting the technological advances made in the rapidly moving field of chemical weed control.

Looking at the over-all picture, it is evident that our most urgent need is for more emphasis on basic research in our weed control programs. At present, workers have too little time at their disposal, or facilities are inadequate, to develop hard-hitting basic research programs.

The following points are made as possible means of placing the basic research phase of chemical weed control on a sounder basis:

1. Seek out and employ more men with sound training in bio-chemistry and plant physiology, botany and ecology, and soils and micro-biology to study those problems which their training qualifies them to attack.

2. Encourage a large number of graduate students to study basic weed control problems under competent professors. This would not only help fill the vacuum in current weed control research, but would also provide a reservoir of trained personnel for employment as the field of weed control expands.

3. Present weed research personnel should be given the opportunity to give more attention to those basic problems that appear as stumbling blocks in finding answers to practical problems.

1955 Research on Weed Control in Cotton

DR. WALTER K. PORTER, JR., Pathologist, Louisiana Experiment Station, Baton Rouge.

THE PROBLEM OF what to do with Johnson grass—especially that which occurs in clumps in cotton fields—received considerable attention in 1955. Rea reports that, in Texas, various herbicidal oils can be used to satisfactorily control and finally eliminate Johnson grass in cultivated crops. His data indicate that from four to six spot-oilings of Johnson grass clumps will eliminate up to 95 percent of this weed in one year. Since the number of clumps will vary from acre to acre it is not possible to calculate any average cost per acre for treating. However, in one experiment 330 acres were spot-oiled five times at a cost of $4.40 per acre for labor and materials. In another experiment six spot-oilings cost $14.10 per acre and eradicated 96 percent of the clumps. Hoeing of Johnson grass four to five times in fields with comparable infestations cost from $5 to $7 per acre and did not reduce the infestation. Hoeing caused severe crop stand reductions and allowed Johnson grass to seed after lay-by time. Rea points out that, while the spotting method may be more expensive than hoeing, it practically eliminates Johnson grass clumps in one year. Thus, over a period of years, the grower will realize a considerable saving in labor costs.

Rea has also modified or developed equipment for the application of spotting oils. One such piece of equipment is a gravity-flow sprayer which can be carried on the back of applicator. It consists of a two to three gallon tank, a hose line with a quick cut-off valve and a hand spray boom. A flooding type nozzle is used to direct oil to the point of placement. He has also modified conventional insecticide sprayers for use in this work. Laborers can spot treat Johnson grass by means of hand booms connected to the main boom of the sprayer. This increases the efficiency of the operation since it is not necessary either to carry oil on the operator's back or refill small tanks.

Watson of Mississippi reports that commercial Dalapon gave excellent control of Johnson grass clumps in the Mississippi Delta. Grower demonstration type plots at two locations were set up in fields containing moderately high but spotted infestations. Spray solutions were applied with knapsack sprayers. Under the conditions occurring during 1954, the first application required approximately two man hours of labor per acre to spot the infested areas. This treatment required about 8-10 gallons of spray solution to spot a single acre. Subsequent applications of Dalapon spray required less labor and spray solution. Watson concludes that commercial Dalapon at a concentration of one-fifth pound per gallon of water and applied as a thorough wetting spray will give efficient control of Johnson grass clumps. He further states that the optimum time to begin treatment is when the grass is 6-10 inches tall. Subsequent applications should be made at intervals of about three weeks and 3-4 applications have given 95-98 percent control of clumps. With any spotting method, the cotton adjacent to Johnson grass clumps will be killed or injured. However, all workers report that the stand loss is considerably less than when the clumps are hoed.

Miller of California reports results similar to Watson. He reports excellent control from spotting with Dalapon at the rate of one-eighth pound per gallon of water.

A different approach to the Johnson grass problem has been presented by Ennis and co-workers of State College, Miss. That is the use of Dalapon as a pre-planting treatment for Johnson grass control in fields to be planted to cotton. In their experiments Dalapon, at rates from 8-24 pounds per acre, applied to a clay loam soil about two weeks before discing and planting, caused no significant reaction in the cotton. These treatments gave from good to excellent control of Johnson grass.

Ennis states, "Since it is necessary to have the grass above ground and actively growing at the time of treatment, the practical employment of Dalapon in this manner may necessitate some delay in planting." He also points out that the discing operation prior to planting may be responsible for removal of any residual chemical from the final bed.

• **Controlling Morning Glory** — Another problem which occurs to some extent in the Midsouth and to a significant degree

in the West is control of annual morning glory infestations. This weed is generally controlled until lay-by time, after which it may become a very serious problem. It may entangle the cotton plant to the point that machine picking is impossible and handpicking is extremely difficult. From the mechanical standpoint, the continuous use of flame still remains the most effective control method.

A bright prospect now appears on the horizon to the West. Arle and Everson from Arizona report that Karmex W may be used to control morning glory in irrigated cotton. They have found that Karmex W applied just before the last cultivation will give practical control. Their results also show that rates from ¾ to 1¼ pounds of Karmex W per acre, depending upon the soil type, appear to be optimum. An irrigation must follow the application of the chemical to cause an effect on the weed. It appears that the selective action of this chemical is dependent upon the relative locations of the roots of the weeds and cotton plants. At lay-by time the roots of the cotton plant are rather deep in the soil, whereas the young morning glory roots are near the surface. Since Karmex W is rather insoluble and will thus leach very slowly, most of the toxic action of the chemical will remain in the upper soil profile and as a result, it will effect only the morning glory plants.

Arle and Everson suggest that this program be restricted to areas which have a serious morning glory problem. They also suggest that the treated fields not be cropped the winter immediately following the cotton harvest, and be planted only to cotton or grain sorghums the following year. Serious stand reductions of wheat and barley have occurred on soils treated with Karmex W six months prior to plainting grains.

Arle and Everson report that a number of annual grasses can be controlled by the same method as previously discussed for morning glory control. Porter and co-workers in Louisiana have found that lay-by sprays of chemicals such as Dalapon, combinations of Dalapon and Amino Triazole, and Karmex DL can greatly reduce the number of annual grasses and broadleaves in cotton. The vigor of ramaining weeds is reduced, and it appears that machine harvested cotton will be practically free of grassy materials. However, studies pertaining to harvester efficiency and the grade and quality of cotton harvested have not been completed. Until such data are complete it is not possible to state whether or not the use of chemicals as lay-by sprays in the South is practical.

• **Nut Grass Control** — Nut grass continues to be a problem in many fields over the Cotton Belt. As yet, there has not been any chemical program that will solve this problem on the practical level. However, it should be mentioned that the effects of Amino Triazole on nut grass appear to warrant continued studies.

• **Pre-Emergence Research** — Many of the various phases relating to the pre-emergence concept of weed control have been given attention during 1955. Porter and co-workers in Louisiana conducted extensive field studies in order to determine the most practical and economical program using CIPC or Karmex DL as pre-emergence herbicides for cotton.

Several experiments in 1954, as well as 20 in 1955, show that over quite a range of rates, the hoe labor requirement for cotton is independent of the rates of chemical. Broadcast rates of CIPC from 4.5 to 7.5 pounds per acre and Karmex DL from 0.45 to 1.25 pounds per acre result is essentially the same amount of hoe labor reduction. Lower rates of each chemical do not cause as high percent weed control as do the higher rates, but this condition does not result in any increase in hoe time. A good portion of the labor requirement is fixed—that is a certain minimum time is required for a laborer to move over an acre regardless of whether weeds are present or not.

Thompson and Hauser report that CIPC is the most consistently satisfactory pre-emergence herbicide on the coastal plain, piedmont, and limestone valley soils of Georgia. They also report that a new herbicide, Geigy 444, gave good results at two locations. Other investigators have also reported satisfactory results with this herbicide. However, additional work will be necessary before its value can be determined.

• **Post-Emergence Research** — There still remains the need for an early post-emergence chemical which does not require precision application and at the same time affords a moderate degree of residual control of weeds. Harris of Mississippi reports that cyclohexanone, when used as a solvent for CIPC, increases the safety with which CIPC can be used as a cotton post-emergence herbicide. He also reports that certain other solvents appear to be safer than xylene as a CIPC solvent.

Thomas and Porter of Louisiana have developed a combination pre- and post-emergence herbicide applicator. This device consists of a pair of 4-inch wide, 10-inch diameter metal wheels set eight inches apart. An outside axle supports the wheels. A single overhead nozzle can be used for pre-emergence applications and a pair of nozzles on each side can serve for post-emergence applications. This device appears supperior to spray shoes for post-emergence applications since it does not plow into the ground, nor is it difficult to adjust.

Conference Quote:

"It might be better to recommend a schedule of cotton insecticide applications based on calendar dates or number of days from planting than to rely on most planters' opinion."—J. C. GAINES, Texas A. & M. College, College Station.

Combining Methods of Weed Control

CHESTER G. McWHORTER, Agronomist, and O. B. WOOTEN, Agricultural Engineer, USDA, Stoneville, Miss.

WEED CONTROL remains as the last and most difficult gap to bridge before complete cotton mechanization is achieved.

Although research on this problem has been conducted for many years, it has been expanded and intensified in recent years. Many devices, such as mechanical and flame choppers, rotary weeders and flame cultivators, have been tested but found to have certain disadvantages. Within the last eight years the use of chemicals for controlling weeds has received major emphasis. Research and farm use of herbicides have shown that, when properly used to supplement other weed control practices, great savings in man-hours are usually realized.

As an aid in discussing different weed control practices, the various methods are sub-divided into cultural and chemical methods.

• **Cultural Method Control** — Seedbed Preparation: There is no substitute for a good, uniform, well drained seedbed for the best weed control program of any kind. Preparation of a good seedbed is equally important for obtaining best results with pre- and post-emergence chemicals, flaming, or any of the numbers of cultural treatments applied throughout the growing season.

Sweep Cultivation: Shallow cultivation is important in a weed control program to avoid throwing soil into the treated drill area. The newer types of sweeps and cultivators available for this work do an excellent job of weed control in the middles. The importance of proper sweep settings cannot be overemphasized due to the need of maintaining the proper type of seedbed for subsequent weed control operations and mechanical harvesting.

Rotary Hoe: Extensive use during the last several years has shown the rotary hoe to be an effective implement in cotton production. This tool is used for the control of weed seedlings soon after emergence of the cotton and can also be used for breaking crusted soil to promote emergence of cotton. Depending on the size and stand of the cotton, rotary hoeing can be repeated until the cotton is 6 to 8 inches high. A slightly higher than normal stand of cotton is important in using the rotary hoe since about a 15 to 25 percent stand reduction may be obtained during a season. Chief disadvantages are: (1) fails to control weeds under wet conditions when the need is most critical; (2) impractical when the initial crop stand is minimum; and (3) small weeds adjacent to cotton plants escape control.

Cross-Plowing or Cross-Cultivation: This method of cultivation is popular because it not only substantially reduces the amount of hoe labor necessary for weed control but has also shown promise for keeping various perennial weeds under control. Disadvantages: (1) more seed for planting; (2) erosion problems where slopes are excessive; (3) can't be used with furrow irrigation in fields with side slopes; (4) mechanical picker efficiency is often reduced; (5) weeds sometimes infest the hills and their removal by hoeing may be damaging to the cotton.

• **Chemical Methods of Control** — For the sake of simplicity, chemical treatments to control weeds in cotton are usually divided into two categories, pre-emergence and post-emergence.

Pre-Emergence Treatments: These are usually applied to a 12- to 14-inch band centered over the drill area during the planting operation. Most promising chemicals at present include the carbamates and ureas. Of these, CIPC has

been extensively used during the last three years. Cotton has considerable tolerance to this material and, provided adequate precautions are taken, little if any cotton injury is expected. CIPC is highly effective in controlling crab grass and gives some control of pigweed and other annual broadleaf weeds. One of the main disadvantages of CIPC is its too-rapid disappearance under high temperature conditions. Little weed control is expected if drouth periods occur prior to emergence of the weeds. Two substituted ureas have shown excellent promise for controlling weeds in cotton. These herbicides are highly potent, however, and require high accuracy in application to avoid an overdose.

Post-Emergence Treatments: Post-emergence oils and flaming have not achieved the popularity of certain other weed control practices. While it has been demonstrated that post-emergence oils will furnish adequate weed control at a low cost, their application is a precision operation. Equipment must be calibrated and adjusted accurately to insure control of weeds without damage to the crop.

In the middle and late stages of growth, when hoeing is tedious, the only practical solution is flame cultivation. Flame cultivation is usually applied several times after cotton is eight inches high and as a terminal treatment following other weed control practices.

• **Combinations for Control** — In recent years many production tests involving several of the previously mentioned weed control practices have been conducted at the Delta Branch Experiment Station. With few exceptions, all of the newer practices have substantially reduced the amount of hoe labor required for crop production.

Pre-Emergence Treatment: Experimental work at the Delta Branch Experiment Station indicates that use of an acceptable pre-emergence herbicide should be considered as a weed control insurance. If a period of severe weed infestation occurs following planting, a pre-emergence treatment will usually result in a cash saving. Conversely, if the weed infestation is light, a pro-emergence treatment might be slightly unprofitable. This is easily seen since the cost of a pre-emergence treatment ($2-$4 an acre) is roughly equivalent to six to twelve hours of hoe labor at 35c per hour. But such a treatment prior to an extended rainy period would not only reduce hoe labor but could prevent loss of the crop.

Post-Emergence Treatments: Research data indicate that post-emergence oiling gives a greater return per dollar of investment than any other method of chemical weed control. This is true because post-emergence oils are not applied until the need occurs. In several experiments it has been possible to control the weeds throughout the season using oils and a minimal amount of hoe labor.

Many of the weeds escaping post-emergence oil treatments can be controlled by flaming. Like oiling, this practice need not be applied until the need is evident.

Cross-Plowing: Cross-plowing will greatly reduce hoe labor requirements. Unfortunately, this does not necessarily mean that cross-plowing is more economical than conventional cultivation.

Under drouthy conditions where weed infestation was light, production cost with cross-plowing has been slightly higher than that for conventional cultivation. The cost of higher rates of seeding and of at least one additional cultivation tend to offset the reduction in hoe labor under such conditions.

Pre- and Post-Emergence Treatments in Combination: When cotton production is as highly mechanized as is possible with available methods, more labor is usually required for weed control than any other operation. During 1954 and 1955 a cost of production study involving 22 acres was conducted at the Delta Branch Experiment Station in which total cost of production records were maintained for two different methods of weed control — conventional practices and chemical methods. These data show that in 1954, 82 percent of the pre-harvest labor requirements were attributed to weed control when no herbicides were used. When post-emergence oils and flaming were used, only 57 percent of the pre-harvest labor was charged to weed control. In 1955 the weed infestation was heavier and weed control constituted 93 percent of the pre-harvest labor requirements when no chemicals were used, but only 60 percent when chemicals were used. The cost of weed control for both practices was higher in 1955 than in 1954 but approximately the same percent of total pre-harvest cost was charged to weed control each year. Twenty percent of the total pre-harvest cost was paid for weed control each year when herbicides were used, while 24 percent and 26 percent of crop production cost went for weed control when no herbicide was used.

Chemical Industry's Contributions

DR. W. C. DUTTON, Dow Chemical Co., Midland, Mich.

TWENTY-FIVE years ago most agricultural chemicals were simple, inorganic products and they usually were the result of research done in state or federal laboratories. Industry usually became responsible for their manufacture and distribution and sometimes for modification and improvement, but the greater part of the research with them was done by public research organizations. Now, most of the new materials are products of industrial research. Public research organizations, however, continue to perform very important and necessary functions in developing these products to a high state of usefulness and exploring their possibilities and limitations as tools for agriculture.

Industry carries on a continuous search for useful compounds. The first step in this process is to determine if a compound has biological activity. The approach most widely followed by industry is to screen many compounds against a broad spectrum of organisms of various classes that can be maintained continuously under laboratory conditions.

The maintenance of any screening program on an adequate basis is dependent upon a continuous supply of chemicals. They may be old compounds or they may be new. In either case, the organic chemists normally available in any industry group contribute heavily to agricultural chemical research. They may make compounds primarily for study in such work, or their activity in other fields of interest may bring forth compounds useful in agriculture.

The percentage of compounds that show reasonable activity in primary screening studies is small and the proportion that carries through to some good use is very small, sometimes as low as one in four thousand. Those which have shown reasonable activity are normally given further critical study to determine the degree and scope of their activity.

The few compounds that survive the advanced or secondary screening studies are moved into what may be called early or exploratory field study in which they are given small-scale field trials to determine if they have real merit and are worthy of extensive and intensive research to learn their full possibilities and limitations.

Compounds that have proved in ex-

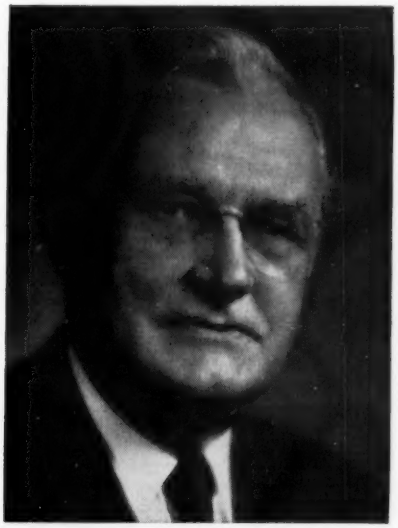
ploratory field work to have merit must be given careful scrutiny at this point to determine if they have a potential use adequate to justify the heavy expenditures that will be required to carry them through. Products approved at this stage are ready to be moved into advanced field study and development and it is at this stage that cooperation between industry on one hand and state and federal research groups on the other is definitely to the advantage of all concerned.

It is not reasonable for industry to carry on advanced research in all areas or with all problems and crops. Cooperation at this stage makes it possible for public research workers to have advanced information on, and experience with new products, and to use them in attempts to solve special problems. Results from such work can be used by industry to support applications for registration and thus make the products available for use by farmers.

New compounds are normally available for initial screening in very small quantities, possibly only a few grams. Those that show promise must be made available in increasingly larger amounts for each stage of study. This automatically calls for careful attention to the manufacturing process in order to insure quality, uniformity and efficiency of production.

This involves a careful study of wetting and dispersing agents, solid diluents, solvents, emulsifiers, stabilizers, inhibiters, etc. Other factors that must be considered are corrosion characteristics, packaging, shelf life, compatability, etc.

Toxicological studies are an essential and expensive item in the development of a new product. If we follow them through the "extensive" stage, they require about three years for completion and it is obvious that, because of the time and costs involved, only very promising compounds are carried into such studies.



Cotton Program Speaker

A. L. WARD, Dallas, Educational Director, National Cottonseed Products Association, will be a featured speaker Feb. 3 on the Cotton Day program at Mississippi State College. The event will present awards from crushers, ginners and others to winners in the 5-Acre Cotton Improvement Contest.

Residue data for crops with which compounds are used are necessary, and obtaining such information is sometimes difficult. Frequently it is necessary to detect as little as 0.1 part per million in various plant and animal products.

Registration of pesticides by the U.S. Department of Agriculture for products that go into interstate commerce is normally required and applications for registration must be supported by information on use and effectiveness. Similar registration is required in many states. If the product is to be applied to crops that are used for food or feed, and if residues exist, residue tolerances must be established by the Food and Drug Administration before a registration can be allowed. The manufacturer must supply data to show that the recommended use will not result in a residue greater than the established tolerance.

• **Long, Costly Job**—From all this you can see that great expenditures are involved in carrying a compound from synthesis to sale for use. It is interesting to note that the minimum period of time required to accomplish this with products that go onto food crops will normally be four to five years.

Total costs involved in developing a new product will vary widely, but some interesting estimates can be quoted. Two studies made three or four years ago indicate in one case a range of $165,000 to $335,000 and the other, which was on a somewhat different basis, arrived at the rather staggering figure of $1,383,000. A more recent survey indicates a cost of around $1,500,000. A representative of one chemical producer has recently indicated that his company has spent more than $2 million for research and development on one product.

The National Agricultural Chemicals Association determined in 1950 that twenty member companies were spending about $4 million annually, and it was estimated that other member companies were spending that much or more, making a total annual expenditure at that time of $8 million for research. Expenditures since that time have unquestionably been heavily increased by the companies active in 1950, and other companies have become active in this field since then. It seems entirely reasonable to indicate, therefore, that the annual research and development expenditures by industry are currently in the range of $12 million to $15 million or more.

This indeed is a significant contribution to the welfare of the agriculture of this country and the cotton industry is certainly a major beneficiary. The broad spectrum of activity of this research program embraces many of the problems which are of serious concern in the cotton industry such as the control of diseases, insects, nematodes and weeds, and the problems of defoliation, desiccation and growth control.

Systemic Insecticide Developments

C. F. RAINWATER, Assistant Director, Cotton Insects Section, USDA, Beltsville, Md.

IN 1954 TWO NEW systemic insecticides appeared highly promising for the control of early season cotton insects when applied in seed treatments. They were called American Cyanamid 3911 and American Cyanamid 12008, and are still known by these designations. During 1955 both insecticides were extensively tested against cotton insects in most of the cotton growing states.

The method of applying the insecticide used most widely consisted of treating the cottonseed with an activated carbon dust mixture containing 50 percent of the technical material. In most cases the 50 percent dust was applied to the cottonseed at a rate which would result in one pound of the actual insecticide being applied to the amount of seed planted to an acre. Treatment of the planting seed was usually done a few days or at most a few weeks before planting.

In general the results obtained with 3911 were a little more favorable than those with 12008 and the following remarks pertain to 3911 unless otherwise stated.

At all locations, without exception, thrips were controlled for periods ranging from three to seven weeks after plant emergence. Aphids and spider mites were also controlled for about the same length of time. At some locations the cotton fleahopper was controlled for about four weeks following plant emergence; also in some locations leaf minor and whitefly damage did not occur in the treated plots whereas a high percentage of leaves were infested in the check plots. At one location cutworms were controlled by the one pound per acre seed treatment.

• **Boll Weevil Control** — Control of overwintered boll weevils was variable. One report states "Our data show that compound 3911 did not control the overwintering boll weevil population." Another report which was more encouraging states: "The boll weevil was abundant early in the season . . . 12 weeks after planting there were four percent punctured squares in the systemic treatment as compared to 20 percent in the check."

Another report states: "When overwintered boll weevils were introduced on caged plants in the one pound per acre 3911 treatment, 15, 21 and 28 days after plant emergence, the net mortalities were 88, 63.2 and 33.2 percent, respec-

tively. No kill was obtained on plants caged 32 or more days after plant emergence. Field records in the large-scale experiments showed the same trend and control was obtained four to five weeks after plant emergence under conditions of moderate populations. In one instance, unded conditions of a heavy population, appreciable control was obtained for three weeks, but was inadequate beyond that period. The 0.5 pound 3911 dosage gave no appreciable boll weevil control."

From still another source we had the following: "Counts on (the population of) over-wintering boll weevils in the test fields showed no significant difference between the seed treatments and the untreated check plots. However, square counts . . . made on June 7 and 15 (48 and 56 days after planting) showed significantly more punctured squares in the check plots than in the treated plots."

Continuing from another source: "There was no difference in boll weevil infestation even in first square counts."

And finally: "Little or no control of boll weevils can be expected from seed treatments in this area. The boll weevil does not enter the fields in large numbers until after the effect of the poison is gone."

So there you have it concerning the effect of 3911 applied as a seed treatment against the boll weevil. Some research workers got some degree of boll weevil control; others did not.

• **Effect on Growth** — As regards the effect on germination and early seedling growth, the results were extremely variable. In some areas reduction in germination was 35 to 40 percent below that obtained with untreated seed. In other cases there was no effect on germination. The effect on germination apparently is tied to both the soil type and weather conditions. The greatest reduction in germination occurred in the Mississippi Delta section of Louisiana and to a lesser degree in the Delta of Mississippi. Little or no reduction in germination occurred in Central Texas or in the Carolinas.

There were conflicting reports concerning the effect of seed treatments on fruiting and again we'll let the reports speak for themselves. From one source: "There was a significant difference in the white bloom count, there being approximately three times as many white blooms in the foliage treatment and check plots as there were in the systemic plots."

Another source: "In comparison with the check . . . systemic treatments retarded maturity as evidenced by bloom counts, boll counts, and the first picking of cotton."

From another source: "Bloom counts made at weekly intervals beginning on June 28 and continuing through Aug. 3 showed no significant differences in the fruiting of the different treatments at any time during the season."

Still another source: "Blooming appears to be delayed in treated plots, but this point needs to be checked again since this was an unusual year in (this) area."

Again: "Plant growth was not retarded by the seed treatments but fruiting was apparently delayed as the early and mid-season bloom counts showed significantly more blooms in the foliage treated and check plots."

Another report states: "The data obtained would not indicate any delay in fruiting as a result of the seed treatments."

And finally: " . . . increased blooming occurred in the seed treatments over untreated check . . . "

So that's the story on effect of systemic seed treatments on fruiting of the plants. There's convincing evidence that under certain conditions insecticide 3911 applied as a seed treatment can protect seedling cotton plants from insect attack and stimulate plant growth. We know, however, that there are hazards connected with its use, so we've got to learn how to overcome these. We've got to learn how to make it effective for a longer period of time. We're not certain at all that the carbon dust treatment of cottonseed is the final answer as the best way to apply it.

• **Caution with Insecticides** — A word of caution concerning the handling of insecticide 3911. **It's extremely poisonous—more poisonous than any insecticide recommended for use today. Carelessness in its use can result in serious consequences.** At present it seems that custom treatment of planting seed by trained personnel under carefully controlled conditions is the only safe course to follow.

There are a number of other new systemic compounds known to possess insecticidal properties. In the laboratory we have found seven new systemic compounds which are highly effective against aphids and spider mites on cotton when applied as seed treatments. Two new compounds were found which appear promising against thrips, and five which appear promising against the boll weevil. Twelve new systemic compounds were tested in small field plots against thrips and boll weevil and three of these showed considerable promise against both insects.

The future looks bright for systemic insecticides on cotton. We already have some which are highly effective against most of the early season cotton insects. Probably the greatest advance in the immediate future will be in finding safer and more effective ways of using those which we already have.

With our present knowledge we are not optimistic enough to believe that we will ever be able to treat a cottonseed with a systemic insecticide, plant it in April, and kill boll weevils which feed on the plant grown from it in August. On the other hand, with further research, we do believe it is entirely within the realm of probability that the plants grown from systemic treated seed will be so effective in killing off the over-wintered boll weevils that the populations can be reduced to a low level, thereby either eliminating or considerably lowering the cost of late-season control.

Conference Quote:

"Costs of controlling weeds represent 25 to 35 percent of the total pre-harvest production costs of cotton in the Southeast."
—W. B. ENNIS, USDA, State College, Miss.

Non-Systemic Insecticide Developments

DR. F. S. ARANT, Head, Entomology-Zoology Department, Alabama Polytechnic Institute, Auburn.

COTTON INSECTS appear to be developing resistance in some areas to insecticides now used for insect control. New systemic insecticides are offering promise in the control of the cotton aphid, spider mites and thrips. However, the boll weevil, bollworm and some of the other major pests must still be controlled with non-systemics.

Bayer 17147 is one of the most promising insecticides developed for control of boll weevils and certain other pests on cotton. This is an organic phosphate material used extensively in experimental work for the first time in 1955. At the rate of 0.25 pound per acre, it is effective in control of boll weevils but will not control bollworms at this dosage level. When 0.5 pound of DDT per acre is added, the mixture will control boll weevils and bollworms. Bayer 17147 will also control cotton aphid, spider mites, thrips and other pests. Its toxicity to higher animals has not been fully evaluated. The level of acute oral toxicity is approximately the same as for endrin, and it is believed that Bayer 17147 is suitable for farm use. The insecticide will not be available in 1956 in sufficient quantities for general use.

Several other chemicals show promise in the control of cotton insects. These include methyl parathion, chlorthion and Bayer L 13/59. All of these insecticides will control boll weevils, cotton aphid, spider mites and thrips. The addition of DDT is necessary for control of bollworms. The residual action of these materials is rather short, and they appear to break down rapidly when temperatures are high and humidities low. It is probable that methyl parathion and

chlorthion will be recommended for use on cotton in 1956. The toxicity of methyl parathion is considerably higher than that of chlorthion.

Endrin is not a new compound, but its usage is new on farms in sizeable portions of the Cotton Belt. Endrin is one of the most effective of the insecticides for the control of boll weevils and bollworms. It may suppress aphid populations to some extent. It will not control spider mites. There is evidence of boll weevil resistance to this compound, along with other chlorinated hydrocarbons, in some localities in Louisiana.

In conclusion, it would appear that Bayer 17147 is the most promising new non-systemic insecticide for use on cotton. It appears to be one of the best materials yet developed. Methyl parathion, chlorthion, and L 13/59 are also promising non-systemics.

Insect Control Timing, Application Methods

DR. J. C. GAINES, Head, Entomology Department, Texas A. & M. College.

DURING the past season in certain areas of the Cotton Belt, boll weevils proved to be very difficult to control, due perhaps to a number of factors. There is no doubt that improper timing and poor application of insecticides contributed to this lack of control. These two factors are critical in any program of chemical control.

• **Timing of Applications** — Work has been conducted on timing or schedules of applications in several states. In South Carolina, Walker and Watts indicate that the best control of insects and the highest yields of cotton were obtained from a scehdule of applications which were started about squaring time.

Arant, in Alabama, has concluded that pre-square applications of insecticides have not increased the yield of cotton in his state.

Reports from Merkl in Mississippi indicate that difficulty was encountered in controlling weevils with chlorinated hydrocarbons on a five-day schedule. Hutchins indicates that many planters delayed applications until the infestation was heavy. This probably accounted for the poor control of weevils in that state. It is his opinion that better control would have resulted from insecticidal applications if they had been started at the first of the season and continued as needed.

Newsom and his co-workers in Louisiana report that difficulty was encountered in controlling the boll weevil when a five-day schedule of poison applications was begun after the weevil population had reached damaging numbers.

In Texas, we did not encounter any difficulty in controlling the boll weevil when the early-season program, followed by later applications, was carried out. The only instances of poor control were encountered in those fields in which the infestations of the weevil were allowed to develop to damaging numbers before applications were begun. The advantages of early control should not be judged wholly on the basis of increased yields. Cotton produced and harvested in the minimum time from planting date is of better quality and the plants are less attractive to the bollworm and pink bollworm late in the season. Better control of boll weevil achieved, by early-season poison applications, has the effect of reducing the overwintering populations.

In Arizona, large gains in yield have been made as a result of thrip control, but in California the early-season control of this pest has not proved profitable according to Smith. Early thrip control paid off in the Waco, Lubbock and College Station areas of Texas. It did not in Louisiana.

Indications from tests in the several states are that schedules of applications should vary for the different areas. However, we should keep in mind that many planters do not know, or will not determine for themselves by taking infestation records, the correct time to apply insecticides. We also are aware that many planters do not obtain adequate insect control on their farms when depending on renters to follow an insect control schedule. Many planters with whom we have talked seem to prefer a recommended schedule of applications to that of applying insecticides when a certain number of insects is found in the field.

May I be bold enough to suggest that it might be better to recommend a schedule of poison applications based on calendar dates or number of days from planting than to rely on most planter's opinion. A program or scehdule of applications which everyone could readily put into effect might prove more profitable in the long run than the one we now have based on infestation counts which frequently are not made.

• **Methods** — Method of application is an important factor in any control program. Under ideal weather conditions, sprays and dusts are equally effective in controlling insects.

In early-season control, while the plants are small, sprays are more effective than dusts. Later in the season, both methods are equally effective.

Effective control of both the bollworm and the boll weevil can be obtained with an equal amount of toxicant, applied in sprays, at varying rates from 2 to 14 gallons per acre. However, the lower gallonage may cause clogging of the smaller openings in the nozzles. Three nozzles per row, delivering 6 to 8 gallons of spray per acre, seem most effective.

A replicated test last year indicated that the hollow-cone spray nozzles give better control of the bollworm than do the fan-type nozzles.

In the application of insecticidal sprays with airplanes, different nozzle arrangements and different amounts of spray per acre are strongly recommended by pilots, as well as by entomologists. Some differences of opinions result from the engineering research on distribution that has not been evaluated with biological tests.

The staff of the Personal Aircraft Research Center at Texas A. & M. College has conducted many tests to determine the best distribution of sprays from various nozzle arrangements. It is, however, very difficult to recommend the exact width of the swath which will give the proper distribution of insecticides under all weather conditions and with all types of planes.

Best control of insects has been obtained from airplane sprays distributed in swath widths of not more than six to eight feet wider than the boom. Twenty-eight nozzles on a 33-foot boom results in a good distribution of the spray. Early in the season, we have obtained good control using two gallons of spray per acre but later in the season, it has been found best to increase this amount to 2.5 gallons per acre by reducing the swath width. In West Texas, an area of low humidity, we have evidence to show that the amount of spray should be increased to at least three or three and a half gallons per acre.

Better distribution of dusts can be obtained by the use of flagmen to direct the pilots. In the distribution of sprays, flagmen are essential. In fact, most pilots request that the planter furnish flagmen in order to insure the proper distribution of the chemical.

Pink Bollworm Developments

DR. S. E. JONES, Coordinator, Pink Bollworm Research Project, Brownsville, Texas.

PINK BOLLWORM RESEARCH has moved forward on many different fronts in the last couple of years.

In hibernation experiments at eight different localities, fall burial of infested bolls caused the lowest survival at localities with mild temperatures and heavy rainfall—that is, at Brownsville, Port Lavaca, Waco, Greenville, and Mount Pleasant, Texas. In localities with colder winter temperatures and less rainfall—that is, at Lubbock and Vernon, Texas, and Chickasha, Okla., survival was lowest in bolls above ground simulating standing stalks.

The Texas Experiment Station has leadership in the development of a stalk shredder that will be more effective than those now on the market in killing larvae in the unharvested bolls. Present commercial shredders may kill up to 75 percent of the larvae in bolls on the plants.

Certain histological and physiological characteristics of the blood were investigated as a step toward orientation in needed basic research on the pink bollworm. There were very obvious differences in the differential counts between active larvae, resting larvae and pupae,

although the total counts remain rather constant with no significant differences. Chemical techniques were used to determine certain components of the blood.

• **Use of Isotopes**—Radioactive isotopes showed promise for use in pink bollworm research, such as moth flight studies. The moths were found to ingest food containing Phosphorus ^{32}. Moths tagged with P^{32} and released were recovered in light traps and readily identified by use of a geiger counter. Moths were recovered from a 1/16-acre cage up to 14 to 16 days after emergence under adverse weather conditions, such as daily rains and wind with little shelter.

In nutritional studies of pink bollworm diet at College Station, larvae were reared on synthetic media, using aseptic methods. A food having a protein-carbohydrate-fat ratio similar to that of the cotton boll, at about 20 days after flowering, appeared to be the most satisfactory medium for development of the larvae. All larvae grown on this diet reached maturity and the rate of development was comparable to that of larvae feeding in bolls.

Varietal susceptibility to pink bollworms is being investigated by the Texas and Louisiana Stations. They are making a very thorough investigation in cooperation with the cotton geneticists and breeders there. The Texas Station is also taking the leadership in chemical defoliation and herbicide investigations.

• **Use of Parasites** — In biological control studies, five species of parasites, previously imported from India, were reared in the laboratory for release again this year. Some 1,043,000 adults were released at 456 sites in 21 Texas counties and at 26 sites in Mexico. Cotton bolls were collected and caged in attempts to determine whether the parasites were maintaining themselves in the field. There was no evidence that any of the imported parasites had become established.

A few preliminary tests have been run to determine the feasibility of controlling the pink bollworm and other cotton insects with pathogenic organisms. Six species of entomogenous fungi have been found lethal to the pink bollworm. The spore forming bacteria *Bacillus thuringiensis* gives 100 percent control of pink bollworm by injection and orally. A nematode, *(Neoaplectana sp.)*, has been found lethal to pink bollworm larvae and to adult boll weevils. Further tests with this nematode are under way at present.

• **Ginning Research** — Modern cotton gins kill a very high percentage of the larvae that go to the gin. In experiments at the U.S. Ginning Laboratory at Las Cruces, N.M., using eleven different gin set-ups, there was no survival in five and a very low survival in the other six set-ups. This research is being continued and every possible effort made to find a better way of killing pink bollworm larvae in seed than through seed sterilization.

Based on research conducted in the past few years, it is now permissible to use a straight blade fan of approved construction and operating under certain specifications for treating gin trash in regulated areas. The gin trash may now be used for feed for livestock or returned to the soil for soil improvement purposes. This discovery also makes possible the elimination of the smoke and fire hazard at gins, particularly those located near towns.

Similar trash fans have been found effective in killing pink bollworm larvae in motes, linters, and hulls at oil mills. The removal of the seed treating requirement at oil mills located in the regulated area and in which gins do not heat-sterilize seed has resulted in an annual saving of $1,250,000.

Delinting of cottonseed through the wet acid process, Kemgas and flame are all effective in killing larvae in planting seeds. No pink bollworm moths emerged from 900 pounds of planting seed produced in Central Texas where heat sterilizers are not used in cotton gins. In 15 pounds of seed from heavily infested cotton, only one pink bollworm moth emerged after the seed was planted in cages. These tests indicate there is little hazard within an infested area from planting locally-produced, unsterilized seed.

In the laboratory at the Pink Bollworm Research Center, 80 chemicals have been tested against the adult pink bollworm. Those showing a high degree of effectiveness against the pink bollworm were also tested against boll weevil and cotton leafworm. Of these compounds, 33 appear promising in the laboratory. In field tests, DDT and Bayer's compound 17147 have given good control of the pink bollworm.

Spinner-Breeder Meet Planned

The 1956 Cotton Spinner-Breeder Conference will be held Mar. 7-8 at Charlotte, N.C., with the American Cotton Manufacturers' Institute acting as hosts. Plans for the meeting have been announced by George B. Walker, Stoneville, miss., chairman of the Delta Council committee planning the event. Hotel Charlotte will be headquarters.

Panel Discussion:

Insect Control Problems And Recommendations

DR. H. G. JOHNSTON, Head, Research Development, National Cotton Council, Memphis, leader.

Southeast

GEORGE D. JONES, North Carolina Extension Entomologist, Raleigh.

IN THE SOUTHEAST, one of the greatest needs is for growers to study their insect problems and know their situation so they will not waste money in the control efforts.

While it is true that insecticides must be applied before serious damage takes place, this does not necessarily mean that a "blanket" program is best, for it is foolish to apply materials when insects are not present. We must do more work with the growers in training and teaching them how to "know" their situation and problems. The insect control program must be based on local conditions. This does not imply that each county should have a separate control program, but rather that each should set up control work based on actual conditions found in the cotton fields. Both the agents and individual growers or the "special" scouts must make infestation counts and study the situation from week to week.

The equipment for applying insecticides is not very satisfactory in our area. Industry can help with this problem. Dealers should provide service and help with proper adjustments. A grower with only a few acres will not invest enough money to obtain a good duster or sprayer. We still have poor owner-tenant relationships as regards furnishing insecticides and carrying on insect control work.

The airplane is not the answer in the Southeast because of small fields, large trees, and numerous power lines. The airplane pilot often collects his pay in

advance and the farmer often gets poor coverage in high winds and at high altitudes. The result is too often a criticism of the insecticide.

Showery weather and wet ground for some 20 days in mid-August in our state prevented the use of ground equipment. The late cotton was hurt severely by boll weevils and bollworms. These conditions still upset all too often, a good control program. A delay of 10 days between applications at this time can almost ruin a splendid control effort.

We feel that in the Southeast we have effective insecticides when applications can be made properly. We still need better control of bollworms. This pest was difficult to control in many fields last year, and was our No. 1 pest in several areas. The systemics offer little hope at present for improving bollworm control, according to available research; and where they look good against the boll weevil they need further testing.

The trend is toward spraying in our area, but we still have many growers who depend on dusters.

Midsouth

DR. CHARLES G. LINCOLN, Head of Entomology Department, University of Arkansas, Fayetteville.

THE GREATEST problem in the Midsouth in 1955 was the development of boll weevil resistance to certain chlorinated hydrocarbon insecticide. Laboratory work at Louisiana State University showed that a strain of weevils collected near Baton Rouge was much easier to kill than weevils collected at certain other locations. The Federal Laboratory at Tallulah, Louisiana, developed data showing that weevils were more difficult to control in 1955 than they were under similar conditions in earlier years.

The boll weevil out-break over much of the Midsouth this year was the result of many factors. Weevils were abundant from the beginning of the season; weather was very favorable for their development. Difficulties were experienced in applying insecticides properly. It is impossible to say how much of the difficulty of obtaining control resulted from resistance to insecticides and how much from other factors.

It is generally agreed that much of the problem of control this year resulted from poor application. There is much work to be done to determine what constitutes good applications. For instance, in tests in Arkansas this year, mid-day applications of dusts with ground machinery gave good control—contrary to our previous ideas on this subject.

In other tests in Arkansas in 1955, we found that a granular formulation of heptachlor is promising for boll weevil control. In Louisiana experiments, heavy early-season applications suppressed weevil build-up for three weeks. Late-season applications in Arkansas, with the granules being applied on the same schedule as for dusts, gave control equal to that from dusts. Compound 17147 gave outstanding control of weevils in Arkansas, and appeared adequate for bollworm, aphids and spider mites.

High clearance machines for applying insecticides came into common use in the delta areas of the Midsouth this year. They afford the best method for a farmer to retain control of his insect situation in late season.

Results of research are of no value unless they are put into practice by the farmers, and a survey in Arkansas indicates that farmers are moving along fast in adopting recommendations. The survey indicated that 66 percent of the acreage was treated according to the county agents' recommendations. It is estimated that yields were increased by 275 pounds of lint per acre where control measures were so applied.

Our program in Arkansas stresses scouting to determine insect infestations. For that reason, scouting may be the best criterion of effectiveness of our Extension program. An estimated 12 percent of the acreage in Arkansas was scouted by commercial scouts. Forty-two percent was "good farmer scouting," and 26 percent more was "poor farmer scouting." This totals to 80 percent of our cotton acreage being scouted for cotton insects as a basis for use of control measures. Eighty percent is a high figure for effectiveness of any program in technical agriculture. It shows that the farmers are ready, willing, and able to do the necessary job on cotton insect control.

Southwest

DR. DIAL F. MARTIN, Professor of Entomology, Texas A. & M. College, College Station.

DURING 1955, the boll weevil was a major problem in many areas of the Southwest. One of the most heavily infested areas included the central and northeastern sections of Texas. The best yields were produced in this area from early-planted, early-treated cotton. Some of the acreage was treated with a few late-season insecticide applications for maximum yields. Late-planted, untreated cotton in most instances was a total loss due to boll weevil damage. In several instances, a crop was produced where 10 or more late-season applications of insecticides were applied to cotton not receiving the early-season treatment; however, profits were small or nonexistent.

In most cases of reported failures in boll weevil control, the grower allowed the weevil population to increase to large numbers before control measures were begun. This, coupled with minimum dosages of insecticides, or too long an interval between applications, failed to result in adequate control.

Investigation of many reported failures to control the bollworm revealed that the lack of success was the result of either waiting too long to begin control measures, or allowing too great a period to elapse between applications of the recommended insecticides, or, in the case of spray applications by airplanes, using too wide a swath width.

Insecticides recommended for bollworm control are rather slow in killing, especially later instar larvae. If the bollworm larvae are allowed to develop to the third or fourth instar before control is started, the results will be disappointing. Best results will be obtained if control measures are begun when bollworm eggs and newly hatched worms appear on the cotton plants.

• **Early Destruction**—The pink bollworm has become well established over a considerable part of Texas. Heavy infestations developed in the central and southern parts of the state during 1955. It is generally concluded among investigators on pink bollworm research that early season destruction of stalks and plowing under of the debris would go a long way toward controlling the pest.

Associated with this good farming practice should be a program of planting as early as possible to secure good growth and setting of the crop within the shortest possible time. The main objective should be to produce the crop before the pink bollworm population has had time to increase to the point of causing extensive damage to the green or immature bolls. We believe that a good early-season control program plus protection of the first fruit with a late-season control program, will aid materially in reducing pink bollworm damage. May I point out that early harvest, early destruction of stalks and early planting, which are recommended for pink bollworm control, are strongly advocated for boll weevil control in much of the Southwest.

The cabbage looper was a problem on cotton in much of the Southwest dur-

ing the 1955 season. The best treatments in field tests with larvae in all stages of development resulted in only about 75 percent control. It was generally observed that looper damage was not extensive in fields which had received regularly scheduled applications of most of the insecticides recommended for control of the boll weevil and bollworm.

Thrips populations in 1955 were extremely heavy on wild host plants and heavy migration to cotton occurred. In many cases a shortening of the interval between applications was necessary to protect new growth.

The brown cotton leafworm was a problem on young seedling cotton in the College Station, Texas, area but infestations generally disappeared by early June. This insect did not reappear in damaging numbers until late in the season after the crop had matured. In fact, the brown leafworm defoliated several thousands of acres of cotton during August and September. Stain, frass and trash were not present as is usually the case in a cotton leafworm infestation.

Far West

DR. H. T. REYNOLDS, Entomologist, California Experiment Station, Riverside, Calif.

RESEARCH AND EXTENSION entomologists out West believe our biggest current problem centers on the economics of insect control, when it will pay off to apply insecticides, and when it will not.

Many of our growers, particularly those with large and diversified acreages, have said to me: "Sure, I can check my own fields for cotton insects and I can evaluate the problems, too, but I don't have time to do it as often as it should be done."

In California and many other states as well, we think the best answer lies in supervised control. This is a system of field scouting and supervision by personnel permanently hired at so much an acre by the grower, or more often a group of growers. Fields are scouted at least weekly, more often when insect populations are critical, by unbiased and specially trained or experienced entomologists. Supervised control makes possible accurate timing of insecticide applications and helps to eliminate needless treatment. The elimination of one treatment per year more than pays the expense of hiring the supervised control entomologist. Maximum advantage can be taken of cultural control and natural control by beneficial insects. To sum up supervised control, it is a system whereby every recommendation is tailored for each individual field.

We firmly believe that supervised control will come about.

A big reason why we think the usage of supervised control will increase is related to the increasing incidence of insect resistance to insecticides. If control is obtained with the fewest number of applications and the lowest total poundage of insecticide, this lessens exposure of the insect in question to the insecticide. Supervised conrtol can be a real benefit in this regard. In addition, the supervised control entomologist can help the farmer take advantage of available insecticides which kill through different modes of action. This can help minimize or delay resistance formation.

Beneficial insects may be particularly important in the resistance picture. They can and must be protected to some degree—partially through elimination of needless applications and partially through selection of an insecticide which is of minimum detriment to the beneficials.

Salesmen and applicators should recognize that they have an overall responsibility to the farmer and the cotton industry as well as to the insecticide industry. If for no other reason than the increasing resistance problem and the lowering margins of profit to the cotton farmer, salesman should sell only approved materials at recommended rates. Above all, they should not urge treatment unless it will show a dollar return to the grower.

Applications of insecticides at rates higher than needed are particularly bad in my opinion. I have the feeling, perhaps unjustified in most cases, that higher costs are sometimes being passed along to the farmer through an attempt to make up for sloppy application procedures by the use of more insecticide. In the long run, it is to the advantage of all concerned to minimize such procedures.

Insecticides and Boll Weevils

FRED C. BISHOPP, Entomologist, Silver Springs, Md.

EXPERIMENTS IN Louisiana indicate that the boll weevil in certain areas is showing resistance to several chlorinated hydrocarbons, but this is no reason for farmers and the insecticide industry to go into a tail spin.

A number of factors, aside from resistance, can explain a large part of the difficulty experienced in controlling the boll weevil in certain areas during the past season.

First, there was a heavy carry-over of weevils last winter. It appears that many cotton raisers didn't take the situation seriously till the first generation weevils were on them and some paid little attention until even later when their fields were very heavily infested. Every farmer knows that it is practically impossible to make a crop after heavy migration has set in. About all he can expect to do under such conditions is to protect the nearly-mature bolls.

A second reason is that growers who attempted to use insecticides according to recommendations were seriously handicapped by frequent rains in midseason, and later in the season were beset by migrating weevils from their neighbors.

In the areas in Louisiana, in which weevil control was difficult, the outstanding climatic condition was the wet, cool summer. The real problem of weevil control began in July when temperatures were low and rainfall excessive.

Look at the Weather Bureau's rainfall records during July in some of the areas where weevil control was difficult. Lake Providence recorded 7.27 inches with rain falling on 14 days, the longest break without rain being seven days. Tallulah had 9.38 inches on 13 out of the 31 days. Monroe recorded 13.42 inches on 17 days, with five days as the longest period without rain. Natchitoches recorded 7.9 inches with 16 rainy days. Alexandria had 7.05 inches falling on 16 days, and Colfax 11.43 inches on 19 days.

How could effective doses of insecticides be kept on the cotton under such conditions?

• **Lower Delta Difficulty** — Greatest difficulty in controlling the boll weevil in Mississippi was experienced in the Lower Delta area. It is interesting to note that during July there was considerably more rain in that area than in the Upper Delta.

Rains slackened early in August, but boll weevils had by that time become extremely abundant and hordes of them were migrating.

The rains which played hob with insecticide application schedules also

■ Treating Cottonseed Will Control Early Insects

TREATING COTTONSEED with a systemic chemical has proved highly effective in controlling early-season cotton pests in field tests throughout the South during 1955. This announcement by USDA during the first annual Beltwide Cotton Production Conference in Memphis, which is reported in detail in this issue, seems likely to represent a major milestone in the control of cotton pests.

American Cyanamid Co., whose product was used in the tests, called the development a "new concept in insect control." Formerly known as American Cyanamid 3911, the systemic has now been named Thimet.

Thimet was extensively tested during 1955 in Texas, Louisiana, Arkansas, Alabama, Georgia, North Carolina, South Carolina and Arizona. At all locations, this organic phosphorus compound effectively controlled thrips, aphids and spider mites for periods of three to seven weeks after plant emergence. Varying degrees of control for different other pests were indicated by research workers.

Limited marketing of Thimet to cottonseed dealers in Texas and Mississippi is expected for treatment of cottonseed for planting the 1956 crop. Cyanamid estimates that, at present production costs, the treatment of seed with Thimet will add about $3 per acre to the cost of untreated seed, but that its use will replace two or three spray applications to control aphids, thrips and mites.

This compound, more toxic than any insecticide presently recommended for cotton, demands extreme care in its use, USDA said. Custom treatment of planting seed by trained personnel under carefully controlled conditions appears to be the only safe application method. Thus, farmers need not handle the concentrated insecticide. They would come in contact with it only when they place treated seed in the planting hopper. By using rubber gloves and taking reasonable precautions, the health hazard from the chemical can be eliminated or reduced to a minimum.

The relationship of the use of this and other insecticides to the pesticide residue regulations of the Food and Drug Administration was the subject of considerable informal discussion at the Conference. Research and industry representatives in general feel that, with reasonable precautions, there is little cause for worry as to residual amounts of these materials in connection with the processing of cottonseed. All stressed, however, the importance of carefully following approved directions for use of any of these chemicals.

caused rapid vegetative growth. Plants of tremendous size required additional amounts of insecticides, but increased dosages frequently were not applied. The large plants also shaded the ground to an extent favorable to weevils.

Heavy, frequent rains undoubtedly interferred with the multiplication of biological control agents, such as delicate wasp parasites and ants that normally play a part in killing immature weevils.

Weather conditions have a tremendous effect on cotton insects of all kinds. These effects are most complex, and in my opinion are understood only in a very general way. J. C. Gaines and associates have studied the effect of temperature, humidity, dew, sunshine, rain and wind on the action on the boll weevil of a number of insecticides and concluded that these factors are important in reducing the toxicity of certain of the commonly-used insecticides. More research in this field is needed. Among other little understood effects is that of rain, soil moisture and temperature on the fumigating, or other indirect action, of several of the materials on weevils in the squares.

Seasonal resistance of the boll weevil to various insecticides has long been recognized. For example, laboratory and field tests have shown that the number of weevils surviving a given dosage of several of the chlorinated hydrocarbons and calcium arsenate increased month by month from June to October.

Extremely high dosages of all materials were necessary to kill high percentages of late season weevils. For instance, it required 240 times as much of one of these insecticides to kill the same percentage of weevils in October as in July. Research indicates that increasing resistance of late season weevils may be due to the nutritional advantage of boll-reared over square-reared insects.

Everyone in the areas where the weevil was hard to control would like to know what is best to do if we get another year like 1955.

• **Nine Points** — In my own opinion the following practices, if carried out, will go far to assure a good crop whether or not the boll weevil in some localities is becoming resistant to chlorinated hydrocarbons.

1. Gather the present crop as soon and cleanly as possible, destroy the stalks and turn under the debris. Use effective stalk shredders, or graze the crop heavily if livestock is available.
2. Plant well adapted varieties in well prepared soil as early as consistent with local conditions. A uniform planting period throughout a community is highly desirable.
3. Treat the seed for disease control.
4. Plant cotton as far as possible from good weevil hibernation quarters.
5. Do not fertilize too heavily, nor irrigate too late.
6. Strive for an early and full set of fruit. This means control of early season pests such as thrips, fleahoppers and other insects that retard growth and delay fruiting.
7. Apply insecticides as recommended by state authorities both as to kind, application schedules, and doseages. Remember that rank stalks and heavy foliage require more material than small plants of open growth. When applying insecticides do not underdose.
8. Keep a close watch for insects in every cotton field. Thorough inspections should be made at regular and frequent intervals, either by the farmer himself or by a competent scout.
9. A community-wide fight against the boll weevil, and a number of other insects as well, is of great value to all, especially in bad insect years.

Essentially, this means that we must not lose faith in our proven insecticides and other insect control practices.

Let's not sell our present materials and techniques short.

Harvest-Aid Chemical Developments

DR. W. H. THARP, Physiologist, USDA, Beltsville, Md.

UNTIL 1947, calcium cyanamide was the only defoliant chemical available in large amounts for testing.

There were many near failures in the earlier days of testing this chemical, even within the presently recommended range. These poor results were due mostly to testing under conditions later recognized as inadequate for calcium cyanamide which must be on the leaf in the presence of moisture for several hours to be thoroughly efficient.

Ammonium Thiocxanate was the first spray defoliant to become available commercially but its use was restricted to the far western sections where dews were unreliable. Its popularity was short lived because its performance was rather erratic. It was highly dependent for efficiency upon absolute maturity of the plant and would often cause very little lead shed along with an almost thorough job of desiccation. These difficulties, along with its highly corrosive action on some metals, caused it to be dropped in favor of newer and more efficient defoliants as soon as they became available.

Monosodium Cyanamide dust became available commercially in 1949 as a hygroscopic dust which could become liquid on the leaf in the presence of high humidities. It has not been on the market for the last several years, primarily because of the highly specific conditions required for efficiency as compared to more recently introduced spray defoliants.

Sodium Chlorate, in mixture with sodium and ammonium borates, was originally introduced as a dry formulation called Shed-A-Leaf. Since then many brand names have appeared and the material has been ditributed in both dry and liquid formations and mixed with many different borates. The more recent tests show that the liquid formulations are perhaps slightly more efficient on a pound of active ingredient basis. This explains, to some degree, the

large number of good results obtained in tests where rates were lower than those within the recommended range.

Monosodium Cyanamide spray has been one of the most efficient spray defoliants available, but its high caustic content has caused it to be removed from the available list this year. In its place, the manufacturers plan to make available a stabilized solution of free cyanamide (H_2CN_2) which has been proved equally reliable in experimental studies conducted over a period of years.

Endothal is marketed today as a 6.3 percent solution with ammonium sulphate. In many laboratory and greenhouse tests Endothal has shown defoliation efficiency at rates lower than those which can be used successfully for any other cotton defoliant available today. Under field conditions, however, it seems to be highly dependent upon plant and weather conditions.

Pentachlorophenol, although properly classified as a desiccant, has often been tested in comparison with defoliants and found to cause considerable leaf drop under conditions where natural leaf fall would have been rather profuse some days later. You will note that it is found at times to be more effective as a defoliant as the rates are reduced below the range required to give reliable desiccation. Pentachlorophenol is usually applied in diesel fuel or kerosene and its action upon the leaf is immediate. As a result, it stops boll development faster than most true defoliants and is seldom recommended for treatment except where the majority of the bolls are open.

Magnesium Chlorate Hexahydrate, first available commercially in 1952, is one of the more efficient spray defoliants available.

Sodium Ethyl Xanthate was introduced commercially in 1953. Its test and commercial performance has been somewhat erratic because, like all present day defoliants, it works better under some plant and weather conditions than others. It is termed a "hot" defoliant because the concentrations needed to induce defoliation are such that considerable desiccation may occur prior to leaf fall.

Amino Triazole was available commercially for the first time in 1955. Therefore, the recommended rates might easily be altered following a report of this season's performance. This chemical can be used effectively in combination with reduced rates of other defoliants, or alone for both defoliation and growth control. It is evident from recent research that rates must be higher in the West than in the East. Rates that have been found effective in North Carolina, for example, must be nearly doubled to do the same job on the high yielding cotton in the Far West.

Plan New Oil Mill In California

Construction of a new oil mill at Blythe, Calif., is scheduled to start in January, according to C. A. Piercey of Vegetable Oil Products Co., which operates plants at Wilmington, Calif., and Gilbert, Ariz. Piercey said that the firm plans to encourage production of soybeans in the Palo Verde Valley, as well as to process cottonseed.

Obtaining Optimum Defoliation

FRED C. ELLIOTT, Texas Extension cotton specialist, College Station.

TRUE DEFOLIANTS are used in Texas in (1) the Lower Rio Grande Valley, (2) South Texas, (3) Gulf Coast, (4) River bottoms and (5) Western irrigated areas. This largely coincides with the areas where spindle pickers are used. Also, true defoliants are used in Central Texas and on the High Plains when weather and moisture conditions are favorable. Defoliation makes cotton more attractive to hand pickers and perhaps 80 percent of the Lower Rio Grande Valley acreage received harvest-aid chemicals this year.

Conditions existing at time of defoliation usually fall under about three classifications:

1. **Ideal or normal conditions** — when the air is calm with sufficient humidity and dew to activate the materials and growth has been normal. Under these circumstances farmers use dusts or water-soluble materials.

2. **Less humid weather but with reasonably normal growth,** usually associated with some winds, lack of dew and lower soil moisture. Under these circumstances farmers use water-soluble materials applied as sprays.

3. **Dry conditions,** associated with low sub-soil moisture, small plants, tough leaf, higher winds and lighter soils. Under these conditions farmers usually consider the use of desiccants to avoid defoliation failure.

In areas of short growing season and higher altitudes where early frosts may occur, defoliation is sometimes a questionable practice. If farmers have been able to get their crop planted early, growing conditions have been normal and cotton is mature, they may consider defoliating two or three weeks ahead of the average date of first frost in order to have the plants in the process of drying out at the time of the first frost or first freeze. Materials used will be based on one of the three weather and moisture conditions listed earlier.

Steps that will aid in obtaining better defoliation are:

1. Select materials suited to the given conditions.
2. Carry out a good insect control program.
3. Follow the local fertilizer program.
4. Follow the local irrigation recommendations and avoid late watering.
5. Time the application with maturity of the crop.
6. Use enough nozzles per row on ground machines to obtain good coverage. Usually five nozzles per row for application of desiccants and 10 nozzles (four on each side and two on top) for water soluble materials.
7. Use enough water, at least 25 gallons per acre, with the water-soluble materials.
8. Furnish a flagman for plane application to obtain correct swath width. The flagman should be on the lookout for nozzle stoppage and flag the pilot in if necessary.
9. In less humid areas, increase the water to get better coverage and thus allow for the lower humidity.
10. Avoid applying desiccants too early.
11. Include the ginner in the educational program.

Good defoliation will assist in controlling the pink bollworm and other insects.

Conditions Under Which Defoliation Pays

DR. H. R. CARNS, Physiologist, and DR. GRADY B. CROWE, Economist, USDA, Stoneville, Miss.

THIS REPORT summarizes the results of a three year study in the Yazoo-Mississippi Delta concerned with the economic feasibility of using chemical defoliation in cotton as an aid to mechanical harvesting. The study was begun in 1953 after it had become apparent that under certain conditions cotton could be harvested mechanically without defoliation and with no apparent loss in yield or grade.

Five-acre blocks were considered to be the largest size that could be satisfactorily controlled within the limitations of the study.

In 1953, eight locations were finally selected and one was subsequently lost because drouthy conditions adversely affected the block uniformity. Two tests were relocated for the same reason.

In 1954, seven locations were eventually selected, one was lost because of drouthy conditions and three were relocated for the same reason.

This year eight locations were selected. Subsequently, three were lost.

• **Condition At Defoliation** — In 1955, rainfall adequate to support a high rate of growth occurred during June and July. This, coupled with high boll weevil populations, produced tall, succulant plants with a small boll load in proportion to vegetative development in some locations, even though final area yields were high. During August and September progressively drier conditions developed until at two locations plants showed evidence of severe water stress. At all locations the advancing moisture deficit

resulted in a high rate of natural defoliation with the remaining leaves showing evidence of being physiologically immature.

As a result of the leaf immaturity, large plants and high leaf density, poor coverage was obtained and a second application of defoliant was necessary at four locations.

Plants, at the time of defoliation, were, in general, larger and more heavily leafed than in previous years. Average height of plants at all locations was 48 inches in 1953, 52 inches in 1954 and 61 inches in 1955. Little or no difference was found in percentage natural defoliation or in open cotton at the time of defoliant application. Natural defoliation ranged from 30 to 36 percent and open cotton from 56 to 63 percent in the three year period.

In 1955, at the time of defoliation, plants were growing actively at three locations and all three required a second application of defoliant. Plant height was fairly uniform, ranging generally between five and six feet. Foliage density ranged from medium to heavy. Plant condition varied from mature to succulent and actively growing.

• **Condition At Picking**—The first picking was made as quickly as possible following acceptable leaf drop; and only in one year, 1955, did this include a reapplication of defoliants. A further distinction between 1955 conditions and the preceding years was the increasing percentage of natural defoliation occurring during the period between defoliant application and first picking. Natural defoliation of the check plot at time of picking in 1953 ranged from 30 to 60 percent, averaging 49 percent; in 1954, 30 to 50 percent, averaging 40 percent. However, in 1955 it ranged from 55 to 85 percent and averaged 64 percent, or about 20 percent greater natural defoliation than in any of the previous years. Although plants this year were larger, tended to be of a more vegetative character, with a greater leaf density at the time they were defoliated, differences in this and previous years between untreated checks and defoliated plots were largely lost before picking could begin.

In 1955, rainfall between defoliant application and first picking varied from 0.41 inches to 4.66 inches. The amount of rainfall within this period increasingly appears to be of importance in the final evaluation of the results.

Defoliation costs were higher than usual in 1955 because of the reapplications necessary at certain locations. However, for seasons when one application is sufficient, the cost of using a liquid defoliant can be expected to be about $4 per acre with present prices. The use of dust defoliants is somewhat cheaper.

• **Yields** — Yields on the defoliated plots last year were lower at four of the five locations studied. These reductions were small, ranging from five to 14 pounds per acre. At one location an increase of 17 pounds per acre was indicated. On the average, reductions associated with defoliation amounted to four pounds of lint per acre.

For the two-year average, yield reductions attributed to defoliation amounted to 21 pounds per acre or about three percent.

• **Quality** — The tendency for defoliation to improve grade, so evident in 1954, was not nearly as pronounced in 1955. In fact, at only one location was any significant improvement made, an increase of roughly $4.35 per bale. At one location a loss of $3.05 per bale was incurred. On the average, grade improvement associated with defoliation in 1955 amounted to about 60 cents per bale. The three-year average improvement in quality was somewhat higher, amounting to $1.80 per bale.

There were gains in picker efficiency with defoliation last year at three locations and losses at two. However, these variations, either way, were small. The average of the five locations showed a net gain in efficiency of .37 percent. In bale-to-the-acre cotton this would amount to about two pounds of lint per acre.

Over the three-year period, dealing with 18 locations, there have been 11 gains and seven losses in picker efficiency. The gains ranged up to four percent and the losses down to 1.5 percent. The net effect over the period has been a gain of .62 percent or three pounds of lint in cotton yielding a bale per acre.

• **Net Return** — Net returns from defoliation, after detucting material and application costs and adjusting for yield reductions, were obtained at only one location in 1955. This gain amounted to roughly $4.30 per acre. At the other four locations losses ranged from $1.61 to $12.16 per acre.

The cost of defoliation was high in 1955 because of the need for two applications at many locations. While yield reductions were rather low this year, so were the returns to the factors which are normally expected to improve with defoliation.

Net returns to defoliation over a three-year period have ranged from a profit of $3.21 per acre to a loss of more than $23 per acre.

The largest contributing factor to the losses was reduction in yield which amounted to as much as $20 per acre. The greatest item of gain was reflected in quality where increases as high as $9 per acre resulted from the use of defoliation.

Average returns are not extremely important for purposes of this study. They simply serve to point out that defoliation may not necessarily be economically feasible under all conditions. More important are the relationships between climatic and plant conditions and the effects of defoliation, measured in net returns, at individual locations. Let us look for a moment at some of these criteria.

At Location No. 2 last year, plant height was about 3.5 feet (low for the area), active growth was not present and foliage density only medium. The plants were very mature and natural defoliation high. Based on past results, little could be expected from defoliation under these conditions. At this location a loss of $10 per acre was sustained.

At Location No. 4 plant height was 5.5 feet, foliage density heavy and the plants were in active growth. However, boll weevil damage was heavy and no cotton was harvested from the top half of the stalk. The leaves on this part of the stalk were particularly difficult to remove. Two applications were necessary to effect a 90 percent leaf drop and by that time natural defoliation was high. Net returns amounted to a $5 loss.

Locations five and seven had tall stalks and dense foliage, but five required two applications and by harvest time there was only a 25 percent leaf-drop differential. Returns here were near the margin. By harvest time at liocation seven there was only a five percent difference in leaves on the plant and returns amounted to a loss of $12.

At location two conditions were favorable for defoliation. Plants were large and foliage dense. Two inches of rain occurred between defoliation and harvest. Net returns were improved by more than $4 per acre. Had not two applications of defoliant been required, delaying the time of harvest, even greater returns could have been expected at this location.

In recapitulation, the study indicates that conditions exist under which a marked economic return will accrue from the practice of defoliation. Such a condition is characterized by rank growth, heavily fruited cotton, maturing

in the presence of high moisture.

By the same token conditions frequently exist under which no such economic return can be expected. These conditions are characterized by small, drouth stressed, heavily fruited plants, from which a large percentage of the leaves have fallen due to natural causes.

In addition there seem to be certain other factors that influence these results.

Excessive boll weevil or other insect damage resulting in restriction of the boll load to certain sections of the plant tends to act adversely on chances of defoliation resulting in economic benefits.

On the other hand, as reported in 1954 and as indicated in this year's data, the occurrence of rains between defoliation and harvest shows a marked tendency to improve benefits derived from defoliation.

Integrated Research And Education

DR. A. H. MOSEMAN, Director, Crops Research, USDA, Washington.

TODAY'S agricultural research has been geared into a smooth-working, production-line operation in most experimental fields. The end product does not reveal the tooling and the teamwork of efforts that have taken place in the process.

The principal contact of the average farmer with research is usually not directly with scientists but through the Extension Service or some similar educational organization. Since research results are fed through Extension Service channels to the ultimate user, it is essential that research and education be coordinated properly if either is to be effective.

Many examples can be given to illustrate the coordination of these two services at both state and federal levels. The "one-variety community" program was conceived to bring about the use of adapted varieties in particular areas.

The one-variety concept was based on research findings, and originally was carried to the field by research people. The program was given great impetus after 1945 by the National Cotton Council and the federal and state Extension Services. In 1954, recognizing that the program had become primarily an educational job, its administration was officially transferred to the federal Extension Service.

• **Ginning Cooperation** — A second example of the coordination of research and education can be found in the field of cotton ginning. Over the past several years, research has made some outstanding contributions to improvement of the cotton ginning process. These include the recipro-cleaner, the stick remover, the lint cleaner, the green-boll and rock trap, the bulk seed cotton feed control, the standard-density press, and "impact" destruction of the pink bollworm.

Assistance in applying these research developments was given to ginners by Extension people, who did—and are doing—an outstanding job. As you know, ginning Extension specialists are now provided by all of the cotton-producing states and the federal Extension Service provides two engineers who train state replacements and visit gins throughout the Belt. Last year over 2,000 gin representatives were given practical instruction in efficient cotton ginning. In addition, more than 300 meetings of farmers and ginners were held to promote better harvesting and ginning.

A third example of this broad cooperation between research and education at all levels is the annual Conference Report on Cotton Insect Research and Control. The ninth such report is being completed at this conference. It will be the result of agreement between entomologists and associated technical workers from state and federal agricultural Experiment Stations, from the Extension Service of 15 cotton-growing states, USDA, and from the National Cotton Council.

A major problem in coordination is in fitting together the proper proportion of research effort on the different problem facets to produce the right answers on the right problems at the right time. We are in much the same position as the cook in a boarding house, with many appetites to satisfy.

• **Changes in Practices** — It is difficult to assess fully the impact of major adjustments in production practices on the job of the research scientist.

Mechanization, for example, has drastically altered the perspective within which the research man must consider specific practices.

The row-crop tractor helped enable one man to grow more cotton than he could harvest. Mechanical harvesters, developed by the farm equipment industry, answered this problem. But with machine harvesting, more foreign matter, immature bolls, and other debris were taken to the gin. Ginning processes had to be revised. This was done by expansion of public-supported research in this field. Defoliants and desiccants become necessary to permit effective use of machines. New plant breeds to provide proper boll distribution, new methods of planting, earlier insect control—all these and many more innovations were necessary for efficient mechanical harvesting.

Another major adjustment of cropping practices has resulted from irrigation.

Supplemental irrigation in the rainbelt is becoming more common and should greatly increase acre yields in the Midsouth and Southeast. Most of the engineering or mechanical phases have been worked out. But other problems are still to be solved. Various aspects of production research will be called upon for answers as supplemental irrigation comes into use in new areas. We should develop a better understanding of the physiology of the cotton plant to determine the nature and mechanism of its response to the new environment of combined natural rainfall and supplemental water. New rainbelt cotton varieties may be called for to take advantage of "water when the plant can use it." Cultural practices and fertilization must be adjusted to insure maximum yield with maximum quality. The increased size of plant may necessitate changes in mechanical pickers. Disease resistance, weed and insect control will require greater emphasis as water stimulates their growth and spread. Equally important, agricultural meteorology must be used more widely than it is today, if the grower is to avoid running his pumps one or two days ahead of a "gully washer." Finally, in some areas we still must face the basic question of whether supplemental irrigation will pay.

We cannot move ahead simultaneously on all these fronts, however desirable that might be. But we must be sure that no aspect falls too far behind and becomes a major limiting factor to overall improvement.

• **Coordination** — Securing the proper balance between the separate scientific disciplines is only one phase in the problem of integrating production research. We recognize that no one agency carries on all research. Some is carried on by the federal government, some by states, and some by private industry. The contributions of all three must be coordi-

Conference Quote:

"It takes 200 bolls of cotton to make a shirt, so a farmer can lose his shirt over and over again on every acre of cotton where the boll rots are severe."—JOHN T. PRESLEY, USDA, Beltsville, Md.

nated if maximum benefits are to be secured.

The federal government usually carries on research which can best be accomplished by a central operation. A typical example is research in ginning, which requires a considerable investment in buildings and equipment. The federal government now has three cotton ginning research laboratories at widely separated locations. Each deals with the set of production practices and problems peculiar to the region in which it is located.

Although federally sponsored, the program recognizes regional differences and gears research to these differences.

The state Experiment Stations are carrying a sizeable program of research designed to meet specific problems and needs within their boundaries. Where interests and problems transcend state lines the research is coordinated, information is exchanged, and every effort is made to prevent overlapping and unnecessary duplication.

Important in the development of an effective cooperative research program is a reasonable assurance of stability of support from each party concerned.

The development of a well-balanced and coordinated program can be adversely affected if there is too much financial interdependence or segmenting of support. I believe the program of research on the pink bollworm has suffered during the past few years because of the uncertainty of support from some sources. This problem will be minimized as the result of the recent action by the southern state Experiment Stations to support the pink bollworm research as a regional project financed by Section 9(b)3 funds, the federal grants to the states for regional research.

Those of us in public research are pleased to have a constantly increasing participation by private industry in various aspects of cooperative cotton production research. The provision of facilities and other support by the California Planting Cotton Seed Distributors and the Arizona Cotton Planting Seed Distributors has been a real factor in the development of effective research programs to guide cotton production in the West.

The support of the National Cotton Council for pink bollworm research and also for the winter generation program of accelerated genetic research at Iguala, Mexico, has made these important programs much more productive than public support alone would have permitted.

Another outstanding field of integrated public and private research is the development of pest control chemicals. Each year hundreds of new chemicals from the laboratories of private industry are screened through the cooperative testing program headquartered at College Station, Texas. Information from these preliminary tests is sent to cooperators in the state and federal Experiment Stations located all across the Belt. At these points, generally through cooperation of industry, further tests are conducted to determine effects of different rates of application, plant response, and influence of different environments on effectiveness of the chemicals.

In this age of increasing dependence on chemicals to step up efficiency of agricultural production, it is essential that the public research agencies work closely with the chemical industry to insure that the best possible materials are found and made available to farmers and that the recommendations are sufficiently precise to protect growers against crop damage that might result from improper use of insecticides, herbicides, or other pest control chemicals.

• **Utilization and Marketing** — This is a cotton production conference and major attention has been given to improved production technology. But we cannot ignore entirely the utilization and marketing problems. They are intimately related to the quantity and quality of production.

In considering cotton's present problems, we might well stop and ask the question, "What do we have to sell?", as we search for markets for our surplus. Have we given sufficient attention to production of the qualities—or variations in quality—that would permit greater versatility in competitive markets? We have concentrated attention on modifying the form and quality of the fiber through chemical or physical treatments, after it has been ginned. These efforts have been extremely valuable in developing a better competitive position for cotton in many uses in recent years. But how far can or should we go in treating cotton fiber as primarily a raw material that must be modified more and more by cost-adding processes, so as to better fit the fiber to various consumer demands?

We should not overlook the opportunities that exist for developing new and better fiber properties through breeding and genetic research. We cannot get improved fiber properties out of the cotton field until we first fix them in the varieties farmers grow. There is a wealth of germ plasm available in the cotton species and in the types commonly grown in the U.S. The transfer of desirable qualities to commercially suited varieties involves laborious and costly breeding and genetic research of a greater magnitude than we appear willing to support at the present time.

Our marketing and utilization problems can be met also in part through more efficient production. Reducing costs will help farmers adjust to lower market prices for their product and move a greater volume into consumption.

In recent years a number of folks associated with the cotton industry have expressed concern about the apparent duplication in studies on quality by the agencies conducting production, utilization, and marketing research. There is no conflict in this triple attention to quality problems. All three groups have a direct interest and responsibility.

Plant breeders, agronomists, pest control specialists, and other production research staff workers are fully aware that new or modified production practices can exert a tremendous influence on the quality of the product harvested.

Those responsible for utilization research must, of necessity, be concerned with the quality of the product and with ways in which that quality can be improved or modified to extend its usage.

Marketing research and service personnel have an equal interest in the quality problem. They must have an understanding of the qualities desired by the purchaser to fit material to demand. They influence quality changes only to the extent that they encourage utilization and production researchers to make desirable modifications.

We appreciate the need for coordination of research in developing improved

techniques and equipment for measuring quality factors, for standardization of methods and terminology, and for scientists in this field to be mutually aware of the progress in quality studies.

One of the most difficult problems faced by research administrators today is the development and maintenance of a balance between fundamental and applied research. We all recognize the need for developing an adequate stockpile of fundamental information. At the same time, the pressure is great to find answers for today's problems immediately.

In general, we are not giving adequate attention to fundamental research in agriculture, but the added public support for farm research in recent years is permitting some added attention to urgently needed basic studies.

In our effort to provide farmers with the right packages of answers to their multiple production problems, we have achieved a high degree of cooperative effort from the state, federal, and private industry scientists working on cotton production problems. Our research teams are pretty well lined up to move ahead on current problems and to meet new ones in a coordinated manner, within the limits of our research resources.

How I Combined Sound Practices

HARRIS BARNES, JR., Connell and Co., Sherard, Miss.

COTTON PRODUCTION has indeed become a very exacting and complicated science and I must say that if all of us farmers had PhD's and our tractor drivers and help had college degrees, the world would be a much nicer place in which to live.

Our company has tried to stay abreast of the times as much as possible, by attending quite a few meetings, visiting the Experiment Stations and reading all the printed material issued by the Extension Service and trade magazines. We learn something new all the time.

More Boll Weevils In Hibernation

More boll weevils entered hibernation during the fall of 1955 then in several recent years, Louisiana and South Carolina reports to USDA indicate. In Madison Parish of Louisiana the number of live boll weevils this fall averaged 13,443 per acre, nearly six times the 19-year average and more than twice the previous high, registered in 1953. Florence County of South Carolina reported 11,398 weevils per acre, the highest average entering hibernation in 13 years of record. The number in both states was five times the average found a year ago.

• **Caring for Land** — Taking good care of our land is something that we really work hard at—for just about everything else we do hinges on what our land is capable of producing. Too often, particularly in the Mississippi Delta, we have felt that, on our fine sandy cotton land, no rotation or rest was needed and the repeated applications of a high rate of nitrogen would bring us the yields desired.

To me, one of our great needs is the realization that our good cotton land needs rotation, rest, organic matter, and the addition of major elements as shown by soil analysis.

In our operation at Sherard, we are great believers in winter cover crops; mainly bur and button clover, as we feel we get more green matter to turn under as compared with other winter legumes. With the present day insecticides, worms are no threat; and with moldboard plows, the actual turning of the green manure crop poses no problem.

On our buckshot or heavy clay cotton soils, we have always made it a practice to cut stalks and bed up the land in the fall. If time and weather permit, we usually disc and hip up the buckshot to kill any grass and to put the ground in better condition. For several years, we have, after cold weather sets in for good and the ground is still dry, applied our full 120 pounds of nitrogen in the form of anhydrous ammonia in the top of the bed. This has proved very satisfactory as the ammonia is easy to apply in the dry dirt and we also get some of the fertilizer work for the next year out of the way. Our sandy land, on which the major portion of the cotton is grown, is never broken until early spring, to lessen erosion and to permit our cattle to graze the clovers and native winter grasses on the land not planted to clover.

In the ten years that I have farmed, we have come from 60 pounds of nitrogen in the form of solids to 120 pounds of nitrogen in the form of anhydrous ammonia. Anhydrous ammonia has certainly been a blessing, both for the ease of application and the reduced costs. Some advantage is to be gained from split applications of anhydrous on sandy land, but we have found that going over the same land twice makes big demands on labor and machinery as the crop is getting a start.

• **Other Practices** — We feel that a clean firm seedbed is essential and have tried never to "rough cotton in." As we know, it is much cheaper to work out grass with plows, harrows and discs than it is with the hand hoe. A discing and hipping up two to three weeks prior to planting can not be "beat" for working up a good seedbed and eradication of grass.

One of the finest tools to come out in a long time, in my opinion, is the combination bed-chopper, harrow and board-drag, now manufactured by several companies. It is the first tool I have seen that will absolutely leave four rows the same height for the four-row planter to follow. This has been one of the big problems—breaking with a one-row mold board plow, discing with a two-row disc, setting up rows with three-row middle-buster, planting with a four-row planter, spraying with a six-row sprayer and starting the cycle again with a one-row cotton picker.

Not enough can be said for good pure seed. In most cases, over $100 an acre will be spent producing the cotton crop and I think we should look at our planting seed like the beef man looks at his $50,000 bull.

If our land that has been disced and hipped up several weeks before and has had a couple of rains since, there is no prettier operation than the four-row combination chopper and harrow on these beds, followed in several hours, after the top has dried off a bit, with a planter. We plant—and pray it will not rain for several days to form a hard ground seal as the young plants try to emerge. Rotary hoes on hard packed soils have saved stands for us, and we try to use them as soon as we see the plant is having trouble coming through.

Chemical weed control has been one of the thrills of farming to me. Without it, I would feel like a man with a family and no insurance. We have suffered only one loss with the chemical and that was in 1950. We replanted in late May and made two bales to the acre.

For the past several years, we have used Cloro IPC and Karmex DL, both with good results and with lasting effects of four to six weeks. The only difference is that CIPC is more expensive. Our bands range from 12 to 14

inches; tractor speeds of 3 to 3½ miles per hour and pressure psi of 30 to 35. The roller is not used because of the packing effect after rains and it is felt, too, that control with the chemicals we use is just as good.

The combination of precision hill-drop planting and chemical weed-control is, to me, a great step forward in the mechanization of the crop, and will help the cotton farmer meet competition of other fibers and curtailment of production. Saving on planting seed cost is one item favorable to hill-dropping and it can easily mean a saving of $5 an acre. Other points in favor of hill-dropping are the farmer's ability to plant an exact number of seed per hill; get a desirable plant population of 20,000 to 35,000; space the hills as he wants them; and reduce the likelihood of hand chopping damaging and cutting out hills that break the stand.

• **Insect Control** — When we see that we have a stand of cotton, we start cultivating and poisoning. These are separate operations, as we feel each operation moves faster and there is no need to tie up money in more spraying rigs because of the necessary slowness of the first cultivation. Many of you will probably not agree with us, but we poinson for thrips twice without checking our fields, at seven day intervals using a long residual poison. With so many jobs going on and our inability to check all fields close, we feel that the two early thrips poisonings pay off for the small cash outlay.

Our third poisoning is for flea-hopper, and is done when first squares appear. From then on, we check our fields as closely as possible for weevils and worms and poison as we see the need. Here is one place in the crop that I feel a good entomologist would pay his way, because most us farmers are too busy and, in lots of cases, do not know what we are doing. Here, also, is the place in the crop where much money can be spent or saved. The costs here could easily exceed the chopping and fertilizer costs. Of course, failure to poison can make you wish you lived with the Eskimos.

• **Weed Control** — Since most of our cotton is chemically treated, we have to protect the treated band, using for our first cultivations disc-hillers and any type of shield to prevent fresh dirt being thrown on the band. As the crop progresses, we use the outside pair of rotary hoes and pledger blades to prevent too much dirt being thrown to the cotton. We feel that even though some weeds do come through the treated band after four to six weeks, the grass is like a stunted calf and never does well. Hence, it would be wrong to throw fresh dirt with new weed seed. High rows also make for bad conditions for mechanical pickers.

With the advent of chemicals for weed control, we were great believers in flame cultivation. We still think the flame cultivator is a good tool, but, whereas we were using five cultivators regularly, we have only used two the past several years. Flame cultivators do not always go hand in hand with chemical weed control because in many cases when the chemical loses its effect, the cotton may be too small to burn and necessitate a chopping. On the other hand, the cotton may be too large and burning would cause severe damage to lower limbs already fruiting. We feel, without a doubt, that flaming consistently during the years has eradicated much grass and has given us more grass-free conditions for our mechanical pickers. If you want to compare flaming with hand chopping anytime, just look at grass in any of your flamed fields, as compared with any of your best tenant's fields.

Weed control should be extended up to defoliation, either in the form of chopping, rogueing or flame cultivation. Many a crop has been left too grassy for machines as the crop was laid by in August. Keeping a crop clean means as much, or more, to the following crops as to the present one. It has always hurt me to see grassy ends and low spots in the field that should be avoided by a mechanical picker. Many a good basket of cotton has been poisoned by grass on the ends and in spots in the field.

• **Defoliation** — Cyanamid has always been a good defoliant for us during years when we could expect good dews. In fact, had we not been through the drouthy years, I doubt if we would have ever tried the liquid defoliants. For the past several years, we have used them, though, and have found them to be very satisfactory. This past year, we used amino triazole in combination, but, under our conditions, we did not find it worth the added $2 to $3 per acre. The one thing we have learned about defoliation is that, dust or liquid, your cotton will not defoliate satisfactorily until the plant and leaves are very mature.

• **Harvesting** — All during the year, we try to keep each planter, cultivator, buster and cotton picker in a field to its own. In this way, we are able to keep close check on each driver and machine. We find that the carnival spirit prevails with the big show of many machines in one field. More cotton does not come up, more cotton is plowed up, less ground is covered and more choke ups are noted, when all the gang is together. Particularly in picking does it help, because one machine dumping on one tralier gives a true picture of the cotton, the plot of land and the condition and setting of the mechanical pickers. One of our big problems in the South is the lack of competent labor for mechanics and for the operation of the many machines, gins and other complicated procedures confronting us every day.

Like every one else, we, with our mechanical pickers and hand pickers, have exceeded our ginning capacity and have felt our best and most economical route was storage on the farm. All picker cotton, picked under the driest conditions of the day, is blown into an open shed with no aeration. As far as mechanical pickers are concerned, the most important item for picking good clean cotton and picking it clean off the row is to have correct adjustment on your spindles, doffers and moisture pads as well as practicing daily good housekeeping within the head. We have definitely noticed certain pickers with fast ground speed and too much suction putting more pepper trash into the cotton.

Irrigation and sub-soiling have been practiced to a small degree. It is felt that both are here to stay, but we have, up to the present time, spent very little money on either and are in a watchful state. Sub-soiling with heavy equipment in certain types of sand and mixed land, has shown greater yields and we have purchased a "D-6" with two sub-soilers to work at depths of 20 to 22 inches.

Irrigation would mean a great cash outlay for us, because we would have to drill wells and use sprinkler systems, as our ground is very rolling. We wonder if the outlay of money and extra work involved would bring a significant difference in yield as we have been blessed with yields of 700 pounds or better in past years. To prove this to ourselves, however, I believe in the next few years, we probably will put in at least a 100-acre system.

Cotton production is indeed a challenging thing to me. There is much that I have to learn and there are many things on which I will reverse my opinion. Possibly in the next few years, with the advances made in the mechanical and chemical fields, we will be able to compete better with the other countries and fibers and I will be able to sell my cotton for less and put my diverted acres back in cotton and take my chances with cotton which I would dearly love to do.

• Jan. 16-18—Southern Weed Conference. Hotel Jung, New Orleans. Dr. E. G. Rodgers, Florida Experiment Station, Gainesville, secretary-treasurer.

• Jan. 19-21 — Texas Cotton Ginners' Association Directors and Allied Industries Meeting. Corpus Christi, Texas. Ed H. Bush, 3724 Race Street, Dallas, executive vice-president.

• Jan. 30-31—National Cotton Council annual meeting. Biloxi, Miss. For information, write National Cotton Council, P. O. Box 9905, Memphis 12.

• Feb. 5-7—Texas Cooperative Ginners' Association, Texas Federation of Cooperatives and Houston Bank for Cooperatives joint annual convention, Austin, Texas. For information, write Bruno E. Schroeder, 307 Nash Building, Austin, executive secretary.

• Feb. 14-15—Southeastern Gin Suppliers' Exhibit. Biltmore Hotel, Atlanta. Sponsored by Alabama-Florida Cotton Ginners' Association, Carolinas Cotton Ginners' Association and Georgia Cotton Ginners' Association. For exhibit information, write Tom Murray, Room 714, Henry Grady Building, 26 Cain Street, NW, Atlanta, or Clifford H. Hardy, P. O. Box 512, Bennettsville, S.C. Concurrent with annual conventions of Alabama-Florida, Carolinas and Georgia ginners' associations.

• Feb. 14-15—Alabama-Florida Cotton Ginners' Association convention. Biltmore Hotel, Atlanta. For information, write Tom Murray, executive vice-president, Room 714, Henry Grady Building, 26 Cain Street, NW, Atlanta. Concurrent with Southeastern Gin Suppliers' Exhibit.

• Feb. 14-15—Carolinas Ginners' Association annual convention. Biltmore Hotel, Atlanta. For information, write Clifford H. Hardy, 400 Broad Street, Bennettsville, S.C., executive secretary-treasurer. Concurrent with Southeastern Gin Suppliers' Exhibit.

• Feb. 14-15—Georgia Cotton Ginners' Association annual convention. Biltmore Hotel, Atlanta. For information, write Tom Murray, executive vice-president, Room 714, Henry Grady Building, 26 Cain Street, NW, Atlanta. Concurrent with Southeastern Gin Suppliers' Exhibit.

• Feb. 28-29—Short Course for Texas Gin Operators. First day at Richards, 1700 South Highway 77, Harlingen, Texas; second day at individual gins. Sponsored by Texas Cotton Ginners' Association, gin machinery manufacturers, and USDA and Texas Extension Services. For information, write Texas Cotton Ginners' Association, 3724 Race Street, Dallas.

• March 6-7—Fifth Annual Western Cotton Production Conference. Fresno Hacienda, Fresno, Calif. For information, write National Cotton Council, P. O. Box 9905, Memphis, Tenn.

• March 7-8 — Cotton Spinner-Breeder Conference. Hotel Charlotte, Charlotte, N.C. American Cotton Manufacturers' Institute hosts. Sponsored by Mississippi Delta Council and cooperating groups.

• March 9-10—Oklahoma Cotton Ginners' Association annual convention. Skirvin Hotel, Oklahoma City. J. D. Fleming, Jr., 1004 Cravens Building, Oklahoma City, secretary-treasurer.

• March 12-13—Cottonseed Processing Research Clinic. Southern Regional Research Laboratory, New Orleans. Sponsored by Valley Oilseed Processors' Association and USDA. C. E. Garner, 1024 Exchange Building, Memphis, Association secretary.

• March 12-14—Midsouth Gin Supply Exhibit. Midsouth Fairgrounds, Memphis. For information, write W. Kemper Bruton, P. O. Box 345, Blytheville, Ark. Arkansas-Missouri, Louisiana-Mississippi and Tennessee ginners' associations sponsor the exhibit and will hold their annual convention concurrently with it.

• March 12-14—Arkansas- Missouri Cotton Ginners' Association annual convention. Memphis. W. Kemper Bruton, P. O. Box 345, Blytheville, Ark., executive vice-president. Concurrent with Midsouth Gin Supply Exhibit.

• March 12-14 — Louisiana-Mississippi Cotton Ginners' Association annual convention. Memphis. Gordon W. Marks, P. O. Box 1757, Jackson, Miss., secretary. Concurrent with Midsouth Gin Supply Exhibit.

• March 12-14—Tennessee Cotton Ginners' Association annual convention. Memphis. W. T. Pigott, Milan, Tenn., secretary-treasurer. Concurrent with Midsouth Gin Supply Exhibit.

• March 18-21—National Peanut Council annual convention. Jung Hotel, New Orleans. For information, write National Peanut Council, DuPont Circle Building, Washington, D.C.

• March 27 — National Cotton Ginners' Association annual meeting. Dallas, Texas. Clifford H. Hardy, Bennettsville, S.C., executive secretary. Will be held in conjunction with Texas Cotton Ginners' Association annual convention.

• March 26-27-28—Texas Cotton Ginners' Association annual convention. State Fair Grounds, Dallas, Texas. Ed H. Bush, 3724 Race Street, Dallas, executive vice-president. For exhibit space, write R. Haughton, president, Gin Machinery & Supply Association, Inc., 3116 Commerce Street (P. O. Box 7985), Dallas.

• April 9-10—Valley Oilseed Processors' Association annual meeting. Buena Vista Hotel, Biloxi, Miss. C. E. Garner, 1024 Exchange Building, Memphis, secretary.

• April 12-13—National Cotton Compress and Cotton Warehouse Association annual convention. Galvez Hotel, Galveston, Texas. John H. Todd, 1085 Shrine Building, Memphis, Tenn., executive vice-president.

• April 22-25—American Oil Chemists' Society spring meeting. Shamrock Hotel, Houston. For information, write Society headquarters, 35 East Wacker Drive, Chicago.

• May 21-22—National Cottonseed Products Association convention. Statler Hilton Hotel, Dallas. John F. Moloney, 19 S. Cleveland Street, Memphis 4, secretary-treasurer.

• June 3-6—National Oil Mill Superintendents' Association annual convention. Plaza Hotel, San Antonio, Texas. H. E. Wilson, P. O. Box 1180, Wharton, Texas, secretary-treasurer.

• June 4-5—North Carolina Cottonseed Crushers' Association and South Carolina Cotton Seed Crushers' Association joint annual convention. Ocean Forest Hotel, Myrtle Beach, S.C. Mrs. M. U. Hogue, 612 Lawyers Building, Raleigh, secretary-treasurer, North Carolina association; Mrs. Durrett L. Williams, 609 Palmetto Building, Columbia, secretary-treasurer, South Carolina association.

• June 6-8—Tristates Oil Mill Superintendents' Association annual convention. Biloxi, Miss. For information, write Roy Castillow, 20 Lenon Drive, Little Rock, Ark., secretary-treasurer.

• June 10-12—Texas Cottonseed Crushers' Association annual convention. Statler Hilton Hotel, Dallas. Jack Whetstone, 624 Wilson Building, Dallas, secretary-treasurer.

• June 16-19—Alabama-Florida Cottonseed Products Association and Georgia Cottonseed Crushers' Association joint annual convention. Lookout Mountain Hotel, Lookout Mountain, Tenn. J. E. Moses, 318 Grand Theatre Bldg., Atlanta, secretary of Georgia Association; C. M. Scales, 322 Professional Bldg., Montgomery, Ala., executive secretary, Alabama-Florida Association.

• June 20-22 — Mississippi Cottonseed Crushers' Association annual convention. Buena Vista Hotel, Biloxi, Miss. Gordon W. Marks, P. O. Box 1757, Jackson, Miss., secretary.

• Sept. 23-26—American Oil Chemists' Society fall meeting. Sherman Hotel, Chicago. For information, write Society headquarters, 35 East Wacker Drive, Chicago.

Irrigation Group Formed

North Carolina Association of Irrigation Distributors has been organized to encourage the wise use of well-designed irrigation equipment. John Easton of Charlotte is chairman of the organization, which was formed at an irrigation short course at North Carolina State College.

• Machine Picks Cotton Blown Off Trucks

A SEARCH for security that took E. B. Fly and his wife to the Texas Lower Rio Grande Valley 32 years ago has resulted in the development of a roadside cotton picker with which Fly hopes to harvest a bale a day this year.

On the day they arrived it was hard to tell where the land began and the water ended, for the levee near Mercedes had just broken, flooding the countryside. The only way back and forth between Harlingen and Combes was by rowboat; this was the introduction to the quick share farming Fly had been depending upon.

Fly's first business venture was with the big vegetable crop of those days, tomatoes. He leased a 40-acre tract and produced a wonderful crop. On Saturday night he paid off his field crew with $364, almost all the cash he had. He made ready to sell the crop Sunday, expecting a net profit of several thousand dollars, but a heavy frost settled over the Valley early Sunday morning, ruining his crop.

"Only one good tomato was left," Fly recalls. "It was away out in the middle of the field all by itself. I was so mad I pulled it and threw it on the ground and stomped it. I couldn't stand having one elegant tomato to look at out of a field of thousands."

Following this fiasco, Fly continued searching for the job which would answer his needs and desires. After more unfortunate episodes in the vegetable business .Fly decided to get into the cotton business, where he stayed for 12 years.

He saw the roadsides thickly dotted with fly-away cotton out of open trucks each season and he spent a lot of time figuring out a way either of keeping the cotton in the trucks, or of recovering it from the roadsides. Deciding on the latter, he made preliminary drawings.

Two years ago he started putting a machine together and then improving on it by the trial and error method, scattering cotton in his driveway and making test runs. This season he has been hitching the machine to a pickup and taking it out on the road and putting it actually to work. The device is composed of a rapidly revolving brush which picks up loose cotton from the roadside and deposits it in a conveyor. The conveyor feeds it into a suction pipe which blows it into the body of the pickup truck.

Fly believes after he gets the bugs worked out of the machine he will be able to pick up a bale of cotton a day. The roadside cotton contains considerable trash, of course, but Fly believes it will bring $100 a bale.

"I still haven't got it working right," Fly said. "I have to put in ball bearings here and there and I have to get it to working routinely, and not breaking down so much, but I think I'm going to make it. Maybe it will give us the security we came to the Valley to find 32 years ago."

■ **CARL MERIWETHER, Western Cottonoil Co., Las Cruces, N.M., is a member of the New Mexico Economic Development Committee, a member of the Mesilla Valley Agricultural Development Committee and a director of his local chamber of commerce, in addition to his numerous activities in the crushing and ginning industries.**

Care in Storing Irrigation Equipment Prolongs Life

Proper storage of irrigation equipment when not in use is important to prolong its life, says E. B. Hale, Tennessee Extension agricultural engineer.

Hale says the equipment should be thoroughly inspected before it is put away for the winter, and that any needed repairs should be made before storage. Hale recommends doing the following things:

"Sprinkler heads left on the pipe become damaged easily in storage. Remove them from pipes, check for wear, and place them in boxes or bins. With the sprinkler heads and risers removed, it is much easier to store the pipe.

"It is best to store the pipe indoors in a dry, well-ventilated place. Outdoor storage, however, is satisfactory if the pipes are separated by wooden spacers so that air can circulate freely about each pipe. The pipes should be at least six inches off the ground and slightly tilted for drainage.

"Engines should be stored in a dry place. Water cooling systems should be drained and the pet cocks left open to take care of possible condensation drainage.

"Engines in storage should have a tablespoonful of cylinder oil put through each spark plug hole and the engine turned over a few times to distribute the oil over the cylinder walls. Breather and exhaust openings should be sealed with a plug or wad of cloth to prevent condensation inside the engine."

Texas Station Issues Fertilizer Bulletin

Analyses of commercial fertilizers sold in Texas during 1954-55 and other information are found in Texas Experiment Station Bulletin 822. Copies may be obtained from J. F. Fudge, state chemist, College Station.

laugh it off

When asked to explain the speckled eggs in her nest, the robin replied, "Oh, I just did it for a lark."

• • •

In these days of low-cut gowns, tight-fitting waists and sheer stockings it takes will power for a man to look a woman in the eye.

• • •

The main trouble with the speed of light is that it gets here too early in the morning.

• • •

A Texan who was visiting in California had been boasting about the healthful qualities of the Texas climate and as proof mentioned that his father, who was 75, still rode horseback. One of his listeners allowed that that was pretty good, but that it couldn't come up to a neighboring Californian the same age who had spent ten hours every day the past week plowing—except Saturday afternoon, when he had to knock off to go to his father's wedding.

"How old is his father?" asked the Texan.

"Ninty-nine."

"What did he want to get married for at that age?"

"Want to? He had to!"

• • •

Cannibal—"What's for lunch?"
Cook—"Two old maids."
Cannibal—"Ugh, left-overs again."

• • •

She: "Now what are we stopping for?"

He: "I've lost my bearings."

She: "Well, at least you're original. Most fellows run out of gas."

• • •

Men are peculiar. For example, a fellow who hadn't kissed his wife in five years shot a man who had.

• • •

It had rained hard. The windshield was sprayed with muddied water and the car had narrowly escaped several collisions.

"Wouldn't it be a good idea to wipe off the windshield?" asked the anxious passenger. "Not worth the bother," cheerfully replied the driver. "I left my glasses at home."

• • •

Every hunting season some accidents happen because both the hunter and the gun are loaded.

• • •

The housewife called out the window to the iceman, "Have you the time?"

"I sure have," came the reply, "if I can find someone to hold the horses."

• • •

Aunty: Precious, what did you do in school today?
Precious: We had nature study. Each child brought in a specimen from home.
Aunty: And what did you take?
Precious: I took a bedbug.

• • •

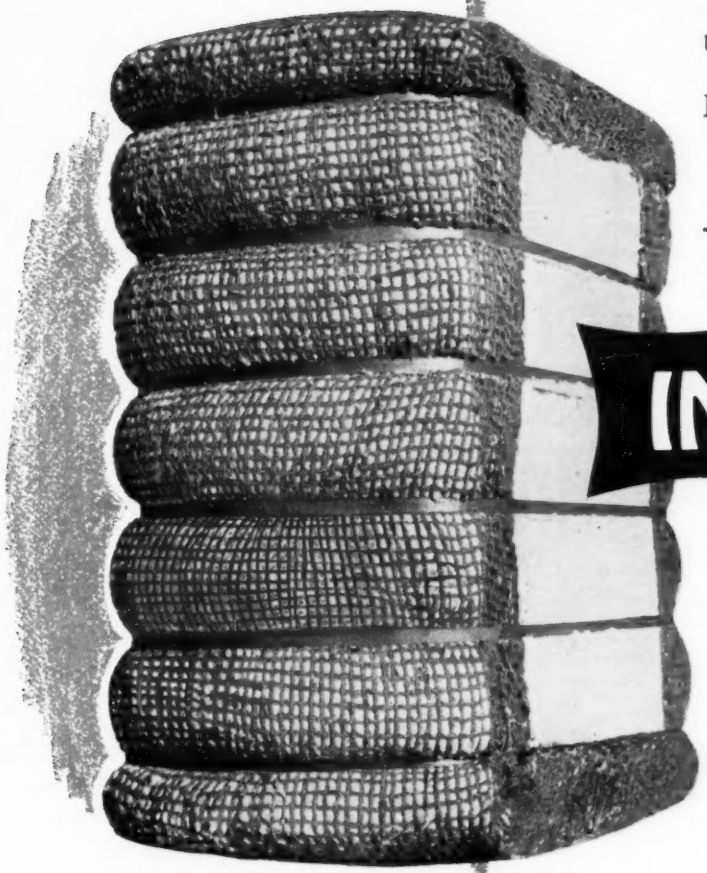
A bishop was taken to a fashionable party at which all the women's gowns were cut very low.

"Have you ever seen such a sight?" asked his hostess.

"Not," answered the bishop, "since I was weaned."

• • •

When all is said and done, another bridge party is over.



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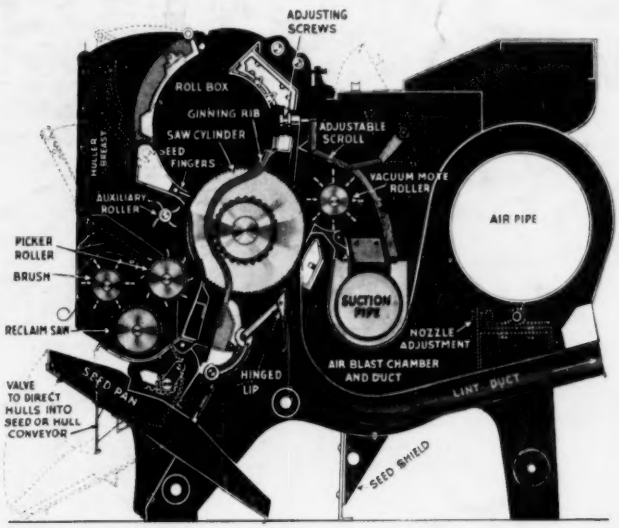
The Safety Features
The Ease of Operation
and
Greater Capacity

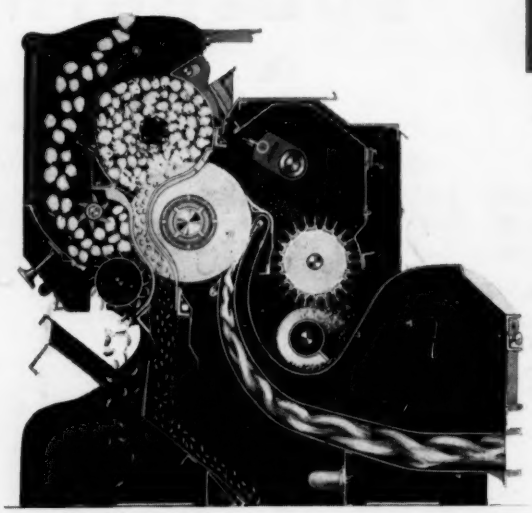
Also Note the Many Outstanding
Construction Features

Descriptive Bulletin Sent on Request



HARDWICKE-ETTER COMPANY

Manufacturers **SHERMAN, TEXAS**



The one Gin HAVING ALL features
wanted by owners and operators

MURRAY

"Safety Gins"

These amazing NEW 90-SAW GINS have been designed throughout with a view of affording operating personnel the greatest possible safety protection. The entire front assembly is hinged at the bottom, so that the top swings forward and away from Saw Cylinder. An important feature of the Recipro (Government Type) Lint Cleaning Bar Assembly is its self cleaning action. The reciprocating action of this device keeps the leading Edge of the Grid Bars clean, and also eliminates possibility of trash building up on top of Nozzle. It is a completely new Gin, of much heavier design, and requiring a minimum of adjustments.

THE MURRAY COMPANY OF TEXAS, INC.

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